The Trade Review and Western Machinist.

FIFTEENTH YEAR.

The only strictly Manufacturing, Industrial and Scientific Paper published in Ohio.

OFFICIAL ORGAN OF THE OHIO INSTITUTE OF MINING ENGINEERS.

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—BY—

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OUR GREAT TRIAL OFFER.

To afford the opportunity to mechanics and others of examining and testing the value of The TRADE REVIEW AND WESTERN MACHINIST, to themselves, the Proprietor will send this Journal three months, for only FIFTY CENTS, postage paid, to any address in this country or Canada.

CHANGE OF MANAGEMENT.

For fifteen years the TRADE REVIEW AND WESTERN MACHINIST has made its weekly visit to a host of readers. In this time it has been the exclusive representative of the industrial and commercial interests of Ohio, unless we were to count ephemeral rivals that have sprung up from time to time only to disappear. This journal has now passed under new management, such as will secure increased efficiency in its several departments, and generally render it of improved value and interest. A number of special features will be added attractive to the mechanic and serviceable to the manufacturer. The new management recognizes the fact that in order to render this a first class manufacturing journal, great judgment must be exercised in the selection of able writers in each department, in order to secure advance ideas, and, as regards mechanics, latest improvements in any given line; and further to adapt such information to the immediate requirements of the classes reached. To this end arrangements are in progress with leading practical and scientific writers. In this connection we would state that we invite correspondence and communications on all subjects brought within the range of this journal.

The enlargement of the scope and increase of the efficiency of the TRADE REVIEW AND WESTERN MACHINIST involves an increase of the editorial staff and an addition to the reportorial force; the *personnel* of the former being composed of practical men well versed in mechanics and mechanical engineering, as well as those qualified to make choice selections from exchanges and to contribute articles of general interest. A correspondence is being opened with engineering and kindred societies in this country and Europe to secure the papers read at their annual and quarterly meetings at the earliest moment, not necessarily for publication, but to place before our readers the substance of such as may prove of practical value. The Manufacturing Department, to which special attention will be given, will contain the latest and most reliable news from this and other States, in addition to which our special correspondence, of late years a most valuable feature, will receive an important enlargement.

Its Departments for *Mechanical Receipts and Items*, *Industrial Science*, *and Railroads and Traffic* will be given prominent positions and will be found to contain a vast amount of useful and valuable information.

The Departments of *Practical Mechanics*, *Mines and Mining* and *Commerce and Marine* will be under the direct personal supervision of editors and reporters selected expressly for their special qualifications in each line. The Markets and Hardware Departments will receive the closest attention, and will be absolutely reliable. Aware of the great importance attaching to accuracy and fullness of information in these latter departments, alike to manufacturers and wholesale and retail dealers, the management will spare no pains to secure the completest information and latest changes in price lists.

Having started out to make the TRADE REVIEW AND WESTERN MACHINIST the most interesting and valuable manufacturing journal in the country, and having abundant capital and ability with which to back it, the new management is resolved at whatever outlay to realize the programme here set forth, and would ask in return the patronage of every mechanic and manufacturer in our vast territory.

WE have all along considered that there is room for improvement in hydraulic jacks, inasmuch as when the work is required to be held up a long time, a portion of the water frequently escapes, and if left to bear pressure for some time or twelve hours, most jacks will be found to have succumbed. We find that a most important improvement has been introduced into the machine by Messrs. W. Reed & Co., the well-known engineers of London. To remedy the above defect, they cut a screw-thread on the raising pillar, which is moreover provided with a large lock-nut having two lugs. As the jack is raised the nut can be screwed up, and will effectually hold the weight even if all the water should escape, and will also save the trouble of blocking up the weight each time a fresh lift is taken.

THE New York Tribune pointedly remarks, in reference to the strike of the freight handlers on the railroad shipping piers of New York city for an increase of three cents an hour in their wages—a strike which has entailed an immense amount of income on shippers and dealers in this State as well as elsewhere—a vast quantity of Ohio perishable products having never reached their markets, and innumerable consignments from New York failing to arrive, that seldom, if ever, have strikers had so many outside forces arrayed in their behalf to compel employers to yield to their demands as the freight-handlers. This is due to the fact that the sympathies and the interests of the merchants for once have been running in the same channel; but whatever the motives, the fact remains that the striking workmen have had strong verbal support. It has not yet profited them much. The railway men are apparently not alarmed at the threats of suits for damages because they have not sent forward the freight delivered to them as common carriers. It will be tolerably difficult, we think, to show that they have not used due diligence. It is said that the Attorney-General deems it his "privilege," as well as his duty," to begin proceedings at once to compel the railroads to perform their work as common carriers regardless of what it costs them. This, it strikes us, is rather high-sounding talk. The suspicion cannot be repressed that some of those who have had so much to say about the enormity of the offence of the railroads have been laying in store anti-monopoly capital against the day when their political aspirations shall take shape. In the end it may appear that, unfortunately, the workmen have made the least out of the strike. They think that the new men cannot be taught to pack freight. This is said to be their only hope. Every day it becomes more slender.

THE agreement come to between the Senate and House conferees on the National Charter Extension bill, resulting in a settlement as to points in controversy in the prelude to an enactment which will satisfy the currency requirements of the country. The Senate amendment providing that National banks with a capital of $100,000 or less shall keep on deposit United States bonds in excess of one-third of their capital stock as security for circulation, has been so amended as to provide that banks having a capital of $150,000 or less shall keep on deposit bonds equal to one-fourth of their capital stock as security for circulation. Any National banking association now organized or hereafter organized, desiring to withdraw its circulating notes upon a deposit of lawful money with the Treasurer of the United States, as provided in Section 4 of the act of 1874, fixing the amount of United States notes providing for a redistribution of National bank currency and for other purposes, will be authorized under the agreement come to, is authorized to deposit lawful money and withdraw a proportinoate amount of the bonds held as security for its circulating notes in the order of such deposits, and no National bank which makes any deposit of lawful money in order to withdraw its circulating notes shall be entitled to receive any increase of its circulation for a period of six months from the time it made deposit of lawful money for the purpose aforesaid, provided that not more than three millions of dollars of lawful money shall be deposited during any calendar month for this purpose. Of course this does not apply to bonds called for redemption by the Secretary of the Treasury or to the withdrawl of circulating notes in consequence thereof.

THE mercantile failures for the first half of the present year show an increase in number and liabilities over 1881, the failures numbering 3,597, as compared with 2,862 in the corresponding period of 1881, and the liabilities 50,000,000, as against $40,000,000 on the first six months of last year. Judged by previous years the figures are most favorable, and it is to be remembered that, in 1881, owing to favoring circumstances, the failures and liabilities were more than ordinarily moderate. An eminent New York mercantile house, which has collated the statistics, affirms that judged by previous years, the figures show a healthy state of business; that their significance is slight, as the rank and file of casualties are confined to the smaller class regarding whom some specific cause of failure can, in most instances, be assigned. Such failures mostly occur in localities in which, together with excessive competition, there is an absence of individual capacity to meet current conditions or want of adequate capital.

AGRICULTURE is still the leading pursuit in the United States. Census Bulletin, No. 288, just issued, shows a vast increase in the number of farms during the past ten years. In 1850 the whole number of farms was 1,449,073; in 1860, 2,044,677; in 1870, 2,659,985; in 1880, 4,008,907. The increase in the number of farms during the decade 1870-'80 was 51 per cent.; in the decade 1850-'60 it was 41 per cent. In 1870 this State had the greatest number of farms; but in 1880 it was third on the list, being surpassed by Illinois and Ohio. Farms are increasing in number in the South, showing that the plantations are being divided. Alabama shows an increase in numbers equal to 102 per cent. during the decade; Arkansas, 91 per cent.; Georgia, 98; Louisiana, 70; Mississippi, 50; North Carolina, 68; South Carolina, 81; Virginia, 60.

MANUFACTURES.

TO MACHINISTS, MANUFACTURERS AND OTHERS.

THE publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

IN continuing our record of applications of electricity as a motor force, we have to note a most curious and valuable one, invented by M. Dupuy, managing engineer of the large linen bleaching works of M. Duchene Fournet, at Le Breuil-en-Ange, France, in the collection of cloth from bleach fields. Each piece of cloth is said to be about 328 feet long, and M. Dupuy had long thought of constructing a railway with special mechanism for bringing in the cloth, but a steam engine in a bleach field is very objectionable on account of the smoke and cinders. The objection does not apply to electricity, and M. Dupuy has had a small line made along the meadows, crossing the ends of the lines of cloth, with a Siemens dynamo-electric machine and collecting apparatus in one vehicle, a set of Faure accumulators, giving the motor force in another (the tender,) and a series of trucks for the cloth. The line is about 1650 feet in length, and has 21 branches. The train goes to the fields empty. On stopping, the machine is set to actuate the collecting apparatus, to which one end of a piece of cloth is brought. The pieces are previously connected end to end, so that the work goes on continuously. The cloth passes into the locomotive truck, and thence over rollers to a truck attached, in which a man sits to guide it. Thus one man will collect about 16,500 feet of cloth in half an hour, an operation formerly taking 11 hours. The train, when loaded, carries nearly 33,000 feet of cloth. The Faure accumulators in the tender are arranged on three shelves, and in hampers containing two each. They are 60 in number, and the weight is 1250 pounds. The system, which has been in work about two months, has given entire satisfaction.

THE Tariff Commission will have a delicate and difficult task to perform in determining what alterations to propose in tariff customs duties. The policy that should guide them is clear. No alterations should be made which will place American industries at a disadvantage. At present customs duties amount to upwards of $200,000,000 per annum, and there is reason to consider that such alterations as will be proposed will not seriously affect this total. The occasion for the commission are that great changes had taken place in the relative value of articles in the tariff schedule from improved methods of manufacture, as in the case of steel; the wholesale evasions of standards of value, as in the case of sugar and the numerous incongruities and defects of existing laws, developed by trial of twenty years with imperfectly patched up amendments—all of which rendered it necessary to revise not only the rates of duties, but the methods of ascertaining and collecting them. The tariff on iron and steel, and manufactures of these now in force, is practically that fixed by the act of 1864, when prices were high, and the specific duties amounted to a low ad valorem duty. The reduction in prices has converted the specific rates into very high ad valorem. This had led importers to so shape their goods as to give a chance of getting through the Custom House at ad valorem rates. The result has been to defeat the intention of the statutes, and this has sometimes been supported in the courts. We may instance the controversies over hoop iron. Hoop iron cut into lengths had for a long time been imported at an ad valorem duty under color of a decision of the Department. Congress failing to act, hoop iron, cut to lengths, was, by Secretary Sherman's order, classed as hoop iron, but Congress later did refund certain moneys to parties who had made contracts under the authority of the former decision, thus, in fact, practically recognizing the new rule. In regard to steel, the act of 1864 enumerates steel ingots and the more finished article as bar steel, subject to high specific rates, but fails to enumer ate steel blooms. Now large quantities are being imported. They have been admitted at 45 per cent. ad valorem, which is one third the duty imposed on ingots and bars. Again, the duty upon steel rods, for the manufacture of wire, which are imported in the form of coils, is held to be 30 per cent. ad valorem, which is out of all proportion, as compared with the rates upon other forms of steel manufactured as far as this. These and other reasons render revision necessary. We find that on the commission, agriculture, as well as manufactures, are very fully represented. It is to be hoped that the tariff will, in the end, be so adjusted that the great iron industries, on which so many other industries are dependent, will be effectively guarded against such evasions as those we have instanced.

OHIO INDUSTRIES.

THE Crucible Steel Company, Cleveland, have added a new building to their works 125x130 feet.

ELBEL, Gilman & Co., Canton manufacturers of saddlery, hardware, carriage and wagon castings, employ 200 hands, and have a product of $18,000 to $20,000 per month.

THE Winster Woodworking Manufacturing Company, of Winster, has been incorporated with a capital of $25,000.

HOLZEMER & COYL is the name of a new firm, located at Toledo, for the manufacture of steam boilers and all kinds of sheet iron work. Their new works, which are of brick, are centrally located, and no doubt will furnish employment to a large force of men in a short time. Both members of the firm are practical boiler-makers.

THE Vulcan Iron Works, Toledo, are employing 80 men on full time. They melt up five tons of pig iron a day, and are busily engaged in constructing railroad excavators, and have recently added about $10,000 worth of new and improved machinery.

THE Brown Manufacturing Company has been incorporated at Cincinnati, with a capital of $20,000.

THE Strowbridge Lithographing Company, Cincinnati, has increased its capital of $100,000 to $300,000.

OUR Columbus correspondent writes: The Champion Dash Company, corner of Spring and Water streets, manufacturers of the Champion carriage dash, employ 30 hands. Trade is reported fair. The Company are erecting extensive works, into which they will move next August, at the same time increasing their force. The additional facilities thus obtained will enable them to meet orders promptly.

THE manufactures of Toledo have been greatly stimulated during the past ten years, and in the last nineteen months they have increased 31 per cent. The number of establishments in 1880 was 411; 1881, 475; total investment of capital—1880, $6,503,535; 1881, $9.625,161; number of men employed—1880, 7,272; 1881, 10,190; wages paid in 1880—$2,608,689; 1881, $3,904,100; value of product—1880, $12,339,300; 1881, $20,004,000. One establishment last year declared a dividend of $90,000, and some of them have paid as high a dividend as thirty-three per cent. Toledo claims to be the largest hard wood market in the West. Within a few miles of the city are almost untouched forests of oak, ash and hickory, walnut and maple, white elm, bass-wood, cotton-wood and sycamore, besides other woods useful to the manufacturer. Toledo's nearness to the mineral regions of the Northwest is a great advantage to her. She received last year 56,000 tons of iron ore, 8,740 tons of pig iron, and 7,600,000 pounds of merchant iron, beside 6,300 tons of scrap. The Milburn Wagon Works, Toledo, have thirty-two acres of ground, all within the city limits, nine of which are covered with factory buildings, warehouses, paint shops, &c. Each of these buildings are five stories high, one hundred feet wide, and four hundred feet long. This company not only make about twenty thousand farm wagons annually, but also about 5,000 spring vehicles. The farm wagon and spring work or carriage departments are entirely distinct. Their trade is largely in the Eastern and Middle States, though they ship their work all over the Union, also to foreign countries, notably to Australia and the colonies.

THE manufactory of saddlery hardware, Canton, covers nearly two acres, and 174 hands are constantly employed.

THE Bartlett Iron and Steel Works, with a capital stock of $500,000, have decided to locate at Vermillion, and have secured a site east of the river, containing about sixty acres of land. The company will give employment to several hundred men.

OUR correspondent from Upper Sandusky writes: The Stevenson Engine Works, manufacturing portable stationary, steam engines, circular saw mills, etc., and of which Messrs. Agerter, Stevenson & Co. are proprietors, employ a large force of hands. The firm was established in 1865. Shipments are made principally to Chicago, Cincinnati and other points in Ohio. Trade is reported satisfactory. The firm will furnish the power this fall to the Ohio State Fair, where they will exhibit their specialties. They manufacture engines from 15 to 150 horse-power.

WE have had the pleasure of a visit from Col. J. E. Dunnigan, the general manager of the Cuyahoga Forge and Iron Co., Cuyahoga Falls. He reports trade good. The works run three hammers. The iron turned out is as good as can be found in the market. The company's specialties are forging, shafting, and railroad axles; they also run a guide mill, which will roll iron from 5-16 up to 1½ inch round. A specialty is made also of hollow and solid stay bolts for boilers; the "Eclipse" brand of horseshoe iron turned out at the works is equal to any made in thr country. The excellence of the axles, shafting and forgings made at these works have secured for the company a reputation second to no manufacturers in the country. They employ 65 hands.

The Atwater Buggy Co,, 359 Woodland avenue, Cleveland, manufacturers of phaetons, surreys, rockaways, piano buggies, Victoria and light road wagons, employ 7 hands. The firm was established in 1881, and are making headway in light carriage work, in which they are unexcelled.

OUR Hamilton correspondent writes: P. Burns & Co., the well known manufacturers of improved cast steel plows of every variety and pattern, and two-horse farm wagons, employ on an average 15 hands. They were established in 1850; they ship to Ohio and Indiana. Their trade is somewhat dull on account of the heavy rains in this section of the State, but good weather will witness revived activity.

A DAYTON correspondent sends us a graphic account of McHose & Lyon's Architectural Iron Works, where are manufactured iron columns, girders, gray iron castings, and all descriptions of wrought iron work. The firm, which has been established five years, employs 85 hands. Their orders already on hand, will keep them busy till next winter.

Mr. K. E. KRITCH, 42 and 44 South Water street, Cleveland, practical machinist, maker of models, metal patterns, and all kinds of experimental machinery made to order, employs 11 hands. Trade has been good, but not equal to last year. He has orders on hand which will keep his force steadily at work for two months. He makes small work a specialty. Contract work is undertaken.

OUR Niles correspondent writes: The Globe Foundry and Machine Works of Mr. John Carter,

where the manufacture of iron and brass castings, engines, pumps, &c., is carried on, employs 46 hands. Trade is reported good, and prospects for the coming season excellent.

OUR Springfield correspondent writes: The Common Sense Engine Company, manufacturers of 3, 5, 7, 10, 15, 20 and 25 horse-power engines, employs on an average 125 hands. They have been established three years, and do a general shipping trade all over the country. Large as their business has been they anticipate that it will be doubled in volume the present year. Some twelve months since they erected a very fine brick building two stories high, with a basement. Size of building 150x52 feet, with two wings, each 80x40 feet. The firm is composed of Messrs. C. F. Yakey and A. T. Byers.

ON Saturday last the new rates established by the pool commission of the leading trunk lines took effect. These rates make an important advance on those previously existing, and advance which has not been imposed without process, from shippers, the most important of which came from the New York Board of Trade and Transportation which on Friday last had an interview with the representatives of the trunk lines at Commissioner Fink's office. To the remark that the increase in freight rates was $2.40 per ton, he replied that the proper basis of comparison was the rates that existed before the railroad war, about 70, 60, 50 and 40 cents a ton to Chicago and the rates that now go into effect, ranging from 60 to 25 cents a ton for the same distance. The inconvenient effect of an extreme change in railroad rates to shippers and dealers is evident, but this must be said, that they have had the full benefit of what was proper by characterized by Mr. Fink as a foolish war. The scale of advance is certainly not acceptable to merchants.

THE Cuyahoga works, Cleveland have just shipped one of their 2,000 lb. steam valve hammers to the Hamilton Iron Forging Co., of Hamilton Ontario.

THE Orville Milling Co., Orville, are putting in Stenen's rolls to give them a capacity of 500 barrels per day.

METCALF & Prindle millers, Mineral Ridge, are about to introduce new machinery.

C. MICHEAL, Ostrander, has refitted his mill with the new process and is doing excellent work. ——Monroe Pense, Columbus Grove, is thoroughly overhauling his mill putting in a six and a two reel bolting chest and Odell rolls, and has contracted for the entire work with the Lima Mill Furnishing Co., of Lima.——Jos. R. Gebhart & Sons of Dayton, have just placed their order with the Case Mfg Co., Columbus, for a full line of their brakes, Machines and rolls. They will have a full fleged gradual reduction mill on the Case system.——Messrs. Roots & Co., Cincinnati, are putting in more of the Case brake machines. They have benn running them over a year on first brake, and are now adding them for some of the other brakes.—*Amer. Milier.*

WE have had the pleasure of being shown through Cleveland Foundry, 9, 11, and 13 Winter street, Cleveland, carried on by Messrs. Bowler & Co. Mr. N. P. Bowler escorted us on our tour, which afforded enlivening sight from the activity everywhere prevailing. No less than 125 men are constantly employed. The specialties of the firm are car wheels and large castings. The works have three cupolas, the largest having a capacity of twenty-five tons. The firm are now running off, on an average fifty tons a day. They have lately added a new buck bedding to their works, which is used for the purpose of boring car wheels and fitting the axles to the same. The structure, which is in successful operation is 50x80 feet. The machinery of the works includes a wheel press that has a capacity of 120 tons pressure, used for pressing in the wheels. We notice several ovens employed for the purpose of baking cores. Take it all in all, this is one of the best arranged shops to be found in the West. The firm reports trade very good, having all the work on hand they can do. The members of the firm are Messrs. N P. Bowler, Wm. Bowler and W. W. Balkwill.

The Orville Milling Co., Orville, are putting in Steven's rolls to give them a capacity of 500 barrels per day.

Metcalf & Prindle. millers, Mineral Ridge, are about to introduce new machinery.

C. Michael Ostrander has refitted his mill with the New Process and is doing excellent work.—— Monroe Pense, Columbus Grove, is thoroughly overhauling his mill, putting in a six and a two reel bolting chest and Odell rolls, and has contracted for the entire work with the Lima Mill Furnishing Co., Lima.——Jos. R. Gebhart & Sons, Dayton, have just placed their order with the Case Mfg. Co., Columbus, for a full line of their brakes, machines and rolls. They will have a full-fledged gradual reduction on the Case system.——Messrs. Roots & Co., Cinncinnati are putting in more of the Case brake machines. They have been running them over a year on the first brake and are now adding them for some of the other brakes.—*American Miller.*

On Saturday last the new rates established by the pool commission of the leading trunk lines took effect. These rates make an important advance on those previously existing, an advance which has not been imposed without protest from shippers, the most important of which came from the New York Board of Trade and Transportation, which on Tuesday last had an interview with the representatives of the trunk lines at Commissioner Fink's office. To the remarks that the increase in freight rates was $2 40 per ton, he replied that the proper base of comparison was the rates that existed before the railroad war, about 70, 60, 50 and 40 cents a ton to Chicago and the rates that now go into effect, ranging from 60 to 25 cents a ton for the same distance. The inconvenient effect of an extreme change in railroad rates to shippers and dealers is evident, but this must be said that they have had full benefit of what was properly characterized by Mr. Fink as a foolish railroad war. The scale of advance is certainly not acceptable to merchants.

Messrs. Kauffman & Burr, Ashland, write us: The Spring Bed trade has been remarkably good this season, having turned out double the quantity this year over any other season. We have greatly increased our capacity for manufacturing and are able to turn out 200 per day. We are at present making 100 per day of the different kinds. We have added new machinery this spring, and are making the celebrated woven wire mattress, in addition to our superior spiral spring beds.

The Cuyahoga works, Cleveland, have just shipped one of their 2,000-pound steam helve hammers to the Hamilton Iron Forging Co., of Hamilton, Ontario.

COLUMBUS INDUSTRIES.

[FROM OUR SPECIAL TRAVELLING CORRESPONDENT.]

COLUMBUS, July 5.

Among the manufactories of this thriving city the extensive saw works of Mr. James Ohlen, one of the most skilled mechanicians of the day, stand prominent. Mr. Ohlen employs 60 hands and runs full time. The fall is the busy season. This is one of the solid houses of Columbus, possessing a national reputation. Shipments are made all over the Union. The manufactory is one of the largest of its class in Ohio. Mr. Ohlen's chisel-tooth has long been famous. Both his circular saws and cross cut saws are made of the best English steel. All sizes of circular saws are turned out, thus meeting every requirement. All workmanship is carefully inspected by Mr. Ohlen, so that no blemish or flaw is likely to pass unobserved. Saws that are not absolutely perfect and true are never sent from the works. The immense stocks which are used in the manufacture of saws are large and valuable. The supply of teeth kept on hand allow of orders for replacement, in case of breaking being immediately filled. The champion chisel tooth was patented August 5, 1879, and October 25, 1881. It has been used in the principal lumber regions throughout the country, and after very severe trials has been pronounced superior to anything in the inserted tooth line. The special feature is that the teeth are distinct, and can be inserted either in solid or other patent tooth circular saws, reducing the size about two inches. As an improvement over all other chisel bits, on the top of the bit there is placed a V shaped section which fits into a corresponding depression in the blade, holding the bit so tight as to prevent any rocking movement. The works were established in 1852, and the business has shown a steadily progressive increase. ——The Case Manufacturing Company, Fifth street, north of Naghten, manufacturers of the Case middlings purifier, Case's "Little Giant" reduction machines, germ and bran rolls, &c., have been established two and a half years. They have 60 hands in their employ. Shipments are made principally west and south. Their business has been on a most satisfactory scale and prospects are good.——The high reputation of the Columbus Elbow Co., manufacturers of superior stove pipe elbows, continues to be fully maintained. There is no probability that it will ever be exceeded in effectiveness. A large number of houses deal solely in their Standard elbow, which completely satisfies every purchaser. The "Stamped" is a regularly curved elbow, affording a perfect draft. The material is of the best quality, and the workmanship perfect. The company are also makers of "National" meat broilers, and "National" safety oil cans. The Company, which has been established seven years, employs on an average, 30 hands. It is sufficient to say of the business done that more orders than ever are on their books.——The Vulcan Iron Works Co., builders of the Vulcan forging tools, Water street, between Chestnut and Randolph, is the title by which the Greenwood Machine Co. will hereafter be known. Their productions include newly improved double and single steam hammers, steam drop and dead stroke power hammers; also radial forging machines, upright gang drills, punches, shears, pulleys, shafting, and iron and brass castings. Mr. W. S. Ide is president; Jas. Greenwood, Vice President, and Mr. R. T. Clarke, Manager. They employ between 40 and 50 hands, and report trade good. Prospects are flattering for an excellent trade throughout the season. The ship principally all over the West, and have a fair Eastern trade. They have several good contracts on hand to fill. They propose to make specialties of steam hammers in the future.——The U. S. Carriage Company, 251 to 261 South Fourth street, builders of fine carriages, buggies and phætons, employing 115 hands, have all they can do, and are building a large addition to their works, 100x100 feet, four stories, which will be occupied as workshops, warerooms and offices. This firm is growing very rapidly since they were established some years ago. Messrs. A. Schlaechter & C. F. Myers are members of the firm.——The Columbus Warm Air Furnace Company, manufacturers of Morley's patent down draft, base-heating furnaces and school room ventilating stoves, corner of Spring and Front streets, experience a growing demand for their productions. Their ventilating furnaces are adapted to any size of building.—— James Pleukharp & Co., manufacturers of extension tables and table slides and leaf supports, corner of Naghten and West streets, have carried on their business for nine years and employ forty hands. Shipments are made all over the Union and Canada. They find it hard work to keep up with orders.——Messrs. L. T. Strader and W. B. Hawkes, Strader's Curtain Cornice Works, corner of Randolph and West streets, manufacturers of patent adjustable window curtain cornices, have all the business they can do, and well merit their success by the excellence of their cornices. They have been established several years.——A capital business is being done by the Excelsior Seat Co., sole manufacturers of the Excelsior wood seat, and also makers of piano box bodies. They employ 14 skilled hands, and ship to all parts of the Union. The seat irons are of the best air furnace malleable iron, and are adapted to the shifting rail, which is made of best Norway iron.——Royce & Pulling, 5 and 7 Scioto street, and 45 West Broad street, manufacturers of improved patent steam pumps, small stationary engines and general machinery, have been established thirteen years, and have thirty skilled workmen in their employ. They have no lack of orders, and may be set down as a most prosperous firm.——At the City Boiler Works, corner of Broad and Scioto streets, I find twenty hands employed. Here are manufactured stationary, portable and locomotive steam boilers, and all kinds of heavy and light sheet-iron work, water tanks, &c., are undertaken. The proprietors, Messrs. Borger, Bros. & Co., have work enough on hand to keep them busy three months. They find some trouble in getting stock fast enough to meet their demands of trade.——Mr. A. Standish, proprietor of the Capital City Machine Works, corner of Spring and Water streets, makes all kinds of machinery works to order. He has been established 12 years, and employs 12 hands. Trade at present is somewhat dull.——Reynolds Bros., manufacturers of justly celebrated all hand cut files, 140 Water street, employ 13 hands, an increase of five hands in the last six months Shipments are made to Michigan, Ohio, and West Virginia, Kentucky and Indiana. Orders keep them constantly

busy.——The new French House, C. E. Phinney, proprietor, crossing of D. & M., P. F. W. & C., and L. E. & L. R. deserves a word of praise for its excellent accommodation, the style in which it is fitted up, and the character of its table. It has a restaurant worthy of any city. The hotel was built in 1876.

INDUSTRIAL SCIENCE.

A New Rotary Stamp Mill.

A new rotary stamp mill, the invention of Mr. J. M. Stuart, a Canadian, has lately been put in operation in London, and both from the manner in which it does its work, and from the favorable opinion expressed with regard to it by practical men, it is not doubted that it will prove effective in the treatment of gold ores. The new mill consists of a series of conical rollers, kept in motion by a rotating plate formed of a series of inclined planes, so that the ore is subjected to a crushing action, while the roller moves along the plane, followed by a sharp stamp-like blow as it passes from one plane to another. In this way a large quantity of work is done with very little power; every particle of ore is brought into contact with the mercury, which, however, is protected from the grinding action, and all the free gold contained is taken out. The mill is simple, and not liable to get out of repair. It can be put up in 24 hours. The ore is amalgamated by one operation, with small loss of quicksilver, which is not liable to triturate. It is claimed that it is only one-half the price of the usual mill, and does its work better. The parts are very few, being, in fact, only the cylinder or battery upon which the false bottom revolves, the five conical stamps placed upon it, and which are moved by the plate, and revolving in an opposite direction, and the very simple gearing which completes the whole. All the available portions of the mill are crushing at one time, so that the utmost speed is obtained, and as it is on the principle of a Mexican arrastra, which is no doubt the best and least expensive mode of obtaining gold, its success is guaranteed by the inventor. It should be seen by all contemplating the erection of machinery, and as the heaviest part need not exceed 5 cwt., it will be valuable in many places beyond the reach of other machinery.

Electro-Assay of Copper Ores.

As a simple, expeditious and fairly accurate method of assaying copper ores, it is proposed to reduce the ore to a uniform powder, then sample and take one-third of an ounce that has been pounded in an iron mortar and passed through a wire gauze sieve of 100 to 120 meshes to the square inch. The sample is stirred into a thin paste with hot water in a porcelain dish or cup. About 2 ounces of strong nitric acid is then added (out of doors), and when the first strong reaction has somewhat quieted, the cup is set in a pan and kept surrounded with hot water. When the red fumes cease (usually in about half an hour) the liquid portion is decanted off into another porcelain dish and placed in a water bath. More acid—an ounce or more if required—is poured over the undissolved residue, and the dish containing it allowed to remain on the water bath another half hour. The partly evaporated acid solution, first decanted, is then carefully washed back into the dish containing the sediment with a little hot water, and the liquids allowed to evaporate to complete dryness over the hot-water bath. Over the dry residue ½ ounce of strong sulphuric acid is poured cautiously, and the mixture is stirred until fumes are no longer given off. Then one ounce of cold water is stirred in, and after a few minutes standing 2 ounces of hot water are added, the mixture stirred, and the suspended matter allowed to settle. The liquid is next filtered through a small piece of good filter paper adjusted in a glass funnel, the filtrate being collected in a small clean vessel of porcelain or glass. The residues are shaken up repeatedly with small quantities of clean water, the washings being thrown on the filter, and the filtered liquids allowed to mix with the clear acid copper filtrate. The dish containing the residues, as well as the filter, must also be rinsed with a little water, so that none of the copper liquid may be lost by adhering to them. If these operations have been properly conducted all the copper will be contained in the filtered liquid. The copper is collected in a simple battery on a platinum plate, and the weight of the copper ascertained. From this the quantity per ton can be readily calculated.

Brightening Iron.

A Bavarian serial contains a method of brightening iron recommended by Boden. The articles to be brightened are, when taken from the forge or the rools, in the case of such articles as plates, wire, etc., placed in dilute sulphuric acid (1 to 20). cleansing the articles, which are then washed clean with water and dried with sawdust. They are then dipped for a second or so in nitrous acid, washed carefully, dried in sawdust and rubbed clean. It is said that iron goods thus treated acquire a bright surface, having a white glaze without undergoing any of the usual polishing operations. This is a process that thoce interested can easily test for themselves. Boden states that the action of the sulphuric acid is increased by the addition of a little carbolic acid, but it is difficulf to see what effect this can have, and it may very well be dispensed with.

To Make Tools.

Warm them slightly and rub the steel with wax or hard tallow till a film gathers. Then write your name on the wax with a sharp point, cutting through to the steel. A little nitric acid poured on the marking will bite in the letters. Then wipe the acid and wax off with a hot soft rag.

Gases of Charcoal Dust.

When the gases arising from a charcoal dust parting are to be avoided, we may use sifted ashes instead. Sometimes soap and ashes are employed, but soap will produce gaseous products.

To Keep Machinery from Rusting.

To keep machinery from rusting take one-half ounce of camphor, dissolve in one pound of melted lard; take off the scum and mix it in as much fine black lead as will give it an iron color. Clean the machinery and smear with this mixture. After twenty-four hours rub clean with a soft linen cloth. It will keep clean for months under ordinary circumstances.

Soldering Cast Iron.

Soldering cast iron is generally considered to be very difficult, but it seems to be only a question of thoroughly making bright the surface to be soldered, and using good solder and a clean swab with muriatic. Sodium amalgam might be usefully employed for the purpose.

MAKING OF STEEL.—Nine-tenths of the iron ores of Europe are so phosphoric as to produce a pig iron unfit for steel making without a process dephosphorization, but through the soft basic Bessemer process steel can be made from a phosphoric pig of an actually purer nature than that obtained from hematite iron. The method is peculiarly adapted to the manufacture of soft, weldable iron, having all of the characteristics of puddled iron, with considerably greater strength, elasticity and ductility. This soft basic Bessemer steel can be made at a less price per ton than the ordinary puddled iron, and a further saving is secured in its subsequent treatment by the smaller loss it involves in rolling. Nearly half a million tons a year of the new metal are now being turned out, and on the continent of Europe works are in course of construction having a capacitv for making another half million tons annually, while in England the new special works erecting have a capacity for producing only 2000,000 tons.

PRACTICAL MECHANICS.

VARIETIES OF BORING BARS.

The boring bar has always been in extensive use for finishing large holes that pass entirely through the material, as the interior of steam engine, pump and other cylinders, and similar work, but the total has generally been considered more in the light of a make-shift than a permanent and exact dependence, and wherever possible other means are chosen. Much of this idea in regard to this useful tool comes from the fact that its parts are sometimes crudely put together and their adjustments are rarely easily made and exactly controlled. Especially is this true of the setting of the cutters and the centreing of the work to be bored. Of course, the latter part of this statement does not apply to the boring bar used in a regular boring mill, where the work is adjusted on a platen having vertical, longitudinal and transverse movements.

Boring bars may be resolved into three general classes. One in which the work passes over the bar, which turns on centres; one in which the bar passes through the work, the bar being suspended in bearings; and one in which the tool head, or "cut-head," traverses on the bar through the work. For general work, where no exact boring mill is used, but the work is done on the lathe, the work is leveled and trued on the lathe ways, generally resting partially on the tool carriage in order to be carried over the bar, and, if necessary, being also supported on planking laid on the ways. With this rig there is much fussing in trueing up and adjusting the work to the exact centre, aud then securing it so that it cannot move during the entire operation. If the hole to be bored is not much larger than the diameter of the bar so that the bar may spring, it is common to use a cutter passed through a slot in the bar and held in place by a key or wedge. It is evident that this is a very crude way of using this tool. Unless the cutter is of the exact diameter of the hole proposed and is set very accurately, there will be but one point of bearing, or cut, and with any inequality in form of the hole to be bored, or any difference in the density and resistance of the metal, the bar will spring more or less, making an uneven hole. In such a case it may be necessary to rebore the hole once or even twice.

A better method is that in which the head for holding cutters, being secured to the bar by a set-screw, the cutters are adjusted by means of wedge-shaped keys. By means of these keys the cutters can be elevated or depressed, and they are held cutting firmly by set-screws on the side of the head. The cutters are not placed on the same line of rotation, but one is in advance of the oteer, as seen in the cut, so that while each one has a bering on the inside of the hole to be bored, each is doing its own particular work. With such a cutter head a single passage through would be all usually required. There is another plan of adjusting work which is to be carried over the cutter bar that is well adapted to many jobs, and obviates all necessity for blocking up on the lathe ways. In this case the cutter head is secured to the bar; as before, but the entire work is swung on the bar, which is suspended on the lathe centres as usual. On the bar, which is accurately turned and finished from end to end, are slipped two glands, which slide freely on the bar, one on one side of the cutter head and one on the other, and have three pointed-head set screws equidistant. If the job to be bored is placed on the lathe and the bar suspended through it on the lathe centres it is readily seen how easily it may be centred by means of these set-screw glands, the screws being slackened and tightened until the exact position is secured. Then the cylinder or other job becomes a part of the glands and as their three respective pointed set-screws hold firmly on the interior of the cylinder at each end, the glands and cylinder move smoothly together over the bar. The feed is that of the lathe carriage to which the work is attached by any suitable means. It may be that the job to be bored is so nearly the size, by inside diameter, that such a gland could not pass in. A hollow gland could then be used having outside set-screws to grasp the work by their points. An instance of the employment of both of these devices is that of a pump, having the plunger portion of the barrel of a much larger diameter than the lower or pipe portion; the inside gland being used for the large end and the outside gland for the small end.

The second class of boring bars is seen in the boring mills built for the express purpose of boring with bars. There is one build of these mills which carries the work over the bar, and others which carry the bar through the work. In these lathe machines the boring bar is splined and passes through a hollow head with a feather fitting the spline, and the other end is received in a smooth bushing. The work is held firmly on the platen and the bar is fed slowly through. In the third class, the tool head is carried through the work, sliding over the bar. In the first, the bar is a round shaft of wrought or of cast iron, turned accurately, and deeply channeled for the reception of a feed screw that passes through a nut. The thread of the screw, and the proportion of teeth in the gear on its end and the pinion on the lathe centre that engages with it, may be easily calculated to give the requisite feed. This style of bar is more easily and cheaply made than ane which must of necessity be a casting and be finished on the planer.

A handy method of holding a cutter that passes through a slot in the boring bar is to hold the cutter against a hardened steel pin that passes across the forward end of the slot, one-half the diameter of the pin projecting into the slot. The cutter is held against this pin by means of a hardened ring held to place by a nut threaded on the bar. The object of this device is to insure security against the canting of the cutter. For small work this plan is effectual. Such a boring bar might be very readily turned into a counter-bore for the lathe or upright drill and be fitted with a number of sized cutters each having a semi-circular notch to engage with the steel steady pin and insure its perfect replacement when put into the bar. The credit of this device is due to J. A. Brown, of Boston, who claimed its introduction several years ago, but it may have been used by others before he made it public. Whosever it may be originally, it is worthy of imitation where the size and style of the job will permit.

Builders of machine tools would do well to give more attention to the use of the boring bar than they have done. There should be small, handy boring mills built and put

upon the market, suitable for work that now is laboriously and imperfectly done by means of the chuck and internal turning tool; or the drill. A good boring bar supported at both ends, traversing holes in work that can be put on an adjustable platen, and held as in a vice for the pillar shaper or milling machine, would find a ready sale. There is a possible perfection in work done by the judicious use of the boring bar that is hardly attainable by any other method.

The Art of Welding.

I have some remarks to offer on the subject of welding iron and steel, which may not be entirely devoid of interest to your readers. The operation of welding is required in almost every piece of iron work used in the construction of wagons, cars, bridges, dwellings, etc. More than half of the blacksmith's daily labor is expended on the work of welding. Hence the importance of thoroughly understanding this branch of the business and of performing the operation in a workmanlike manner. Upon the character of the welding depends, in a great measure, the wear and strength of iron work. The art of welding is one attended with some difficulties. It is acquired only by years of careful study and practical experience. It is not so easy to master as the superficial observer might suppose. The successful smith puts into his work an amount of care and judgment that would hardly be expected by those who are not practically familiar with the trade. Many smiths are very careless in welding, and the bad work they produce frequenlty results not only in loss to their employers, but in damage to reputation. The difficulties of producing solid welds are many, and should be carefully studied by all who dessre to succeed at their trade. A perfect weld cannot be made if any foreign matter comes between the two parts to be united. Hence the necessity of care in this direction. It costs no more in the way of fire to heat two pieces of iron or steel so af to make a perfect weld then to make poor one, an argument which should convince every one of the economy of good work. The losses attending poor work of this kind are to be figured up under several heads. Repairing is necessary. This causes loss of time in returinng the work to the shop. The defective weld may have caused an accident. Cases have occurred in which persons have been killed by reason of poor welding. In returning imperfect irons for repair freight or express charges are involved. After they reach the shop time is required for taking them apart and again in putting together after the poor work has been made good. Still other items might be enumerated, but enough has been presented for illustration. A defective weld is an expensive piece of injustice, and always results in pecuniary loss to the employer and a loss of reputation to the individual smith. There is no valid excuse for a smith having broken irons with bad welds coming back for repairs in any considerable numbers.

If the weld is worth making at all it is worth makiug well. I admit that there are exceptions in welding as in everything else, and that a good smith in some cases may make a weld which he thinks is solid, but which is not. There is no excuse, however, for a smith to have broken irons coming back to him continually. Such a condition of affairs is traceable only to carelessness. Much of the defective work is due to over heating or not heating enough. Still other is due to carelessness in knocking the cinders from the iron before placing them together. Another difficulty is working with a green or new fire, or a fire full of cinders and dirt. In order to make a clean and solid weld, the cinders, which naturally accumulate while the irons are being heated, must always be knocked from them before they are placed together. A smith should not use a tool of any kind on his irons after they are welded, until he has again cleaned the scale from them. No good smith will try to weld his irons if his fire is not in proper shape. It always pays in the end to have a clean and well coked fire before undertaking to weld.

In carriage and wagon blacksmithing the smith's ability is often tried to its full extent. He has not simply one brand of iron and steel to work but a variety ef brands. Experience, however, if he pays strict attention to his business, will soon teach him the nature of the various irons and steels with which he works, so that in time there will be no difficulty in accomplishing the desired results whatever may be the material in hand. One difficulty which new beginners encounter is the tendency to keep pulling the irons in and out of the fires to see if they are hot enough. This alone is sufficient to insure a bad weld. Continuous poking around in the fire causes the irons to accumulate dirt and cinder while it also tears the fire to pieces. Carelessness in matters of this kind frequently results in no hot coal around the irons, and in some cases, with the bare blast strtking the irons. A good welding heat is only obtained by the greatest care in little details of this kind. The smith must keep his irons between hot coals continuously while obtaining a weld heat. By so doing he can get a clean and good job; otherwise, he will fail.—W. R. W. in Blacksmith and Wheelwright.

Hanging and Truing Shafting.

The number of buildings in which machinery is run tha are fully and perfectly adapted to its reception and operation is not in proportion to the number of buildings which actually contain operating machinery. There are very few large buildings of any character in which considerable changes of levels do not take plafle during one year's seas- While these changes are insignificant and unimportant as to their influence on a single complete machine, they have considerable effect on a long line of shafting, cutting boxes, wearing journals and absorbing power. A line of shafting should be independent of the walls of the building. Whatever the material of the building, it will be affected by the extremes of temperature in our climate, extremes ranging through one hundred degrees Fah. The temperature inside a warmed building in winter, and outside may be the difference between 60 deg., and 10 deg., or 70 deg. Now, if the shaft rests on supports having the first-named temperature, and one end rests on a support connected with the cold wall, there must be a difference of level corresponding to the contraction of the wall by cold, or to the difference between this contraction and the normal temperature inside. All supports of long lines of shafting should have their independent foundations in the earth, and, except in short lines, should never depend on the integrity of the floors or the immovability of the walls. Frequent inspection of the main lines and the hunters will save a large and unnecessary expenditure of power. A very handy implement for this purpose is a ten fee, straight edge, with two transverse arms, the complete contrivance forming three sides of a square. These arms should be long enough to look down on the top of the straight edge when the ends of the arms are held against the under side of the shaft. One of the arms may be fixed in position and the other made to slide so that it may be moved to avoid contact with pulleys, etc. A spirit level laid on the straight edge will give the level of the shaft with great accuracy in distances of nine or ten feet. Of course the arms must be accurately of the same length from the point of contact with the shaft, to the other portion of the straight edge, which ought to be from six to eight inches wide and one thick. It can be managed by two men, or better by three, two to place, and one to observe and direct the necessary changes in the adjustment of the boxes. Another method is to stretch a line under the shaft and level it perfectly and then measure to the shaft. One objection to this is that it is impossible to stretch a line of any considerable length, either of cord or wire, that will not sag, and there is no accurate means of determining the amount of the depletion with reference to the shaft. Another objection is that in a factory, or shop, belts and parts ot machines may be in the way and a stretched line is not feasible, With the straight edge three men can test and adjust a length of three hundred feet in an hour or little more.

MECHANICAL RECEIPTS AND ITEMS.

Tempering Cast Steel.

IN Switzerland, razors, pocket-knives, etc., made from English cast steel, are tempered by immersing the blades at a dark cherry red into a bath composed of four parts of finely-powdered yellow resin, two parts of fish oil, to which is added in a very hot state one part of melted tallow. They are allowed to cool perfectly, after which they are healed without wiping them, and hardened in water in the ordinary way. The blades hardened in this way are found to be uniformly tempered, and to produce a fine cutting edge.

New Railway Spike Machine.

A NEW railway spike machine has been successfully tried at the Superior Iron and Steel Works, Allegheny, which will be likely to work a decided advance in that industry. The machine in all its parts is much simpler than any heretofore constructed. All the motions performed by it in the making of the spike are direct and positive. In the operation of the machine, the rods from which the spikes are made are fed directly from the rolls without reheating, thus ensuring that the spikes shall be full and uniform in thickness. The rods are introduced into the spike machine by an automatic table, with a gripper which catches the rod and feeds it into the machine the length of one spike. At the end of the stroke of the feed table, the spike blank is caught and firmly held by a vertical ram, while a pair of reciprocating cutters cut the blank to the required length, and at the same time form the point by a motion which combines the qualities of drawing and cutting, thus bringing the point of the spike to a fine edge. The blank is then released and seized by a strong horizontal ram and carried forward to the header. While it is going forward, the end of the blank is bent over to the right by a quickly acting lever, so that the head is properly formed. At the end of the forward motion the blank is forced against the heading die and the spike is finished. On the return motion the spike is released from the ram and thrown out of the blank holder by a rapidly acting "knocker," when it falls to the floor and the table goes back to the cutters to receive the next spike. All these motions comprise a revolution of the machine, and follow each other so instantaneously that they altogether occupy by a single second.

To Stop Leaks in Rubber Rings.

A SOLUTION of pulverized gum shellac in ten parts by weight of strong ammonia is recommended for stopping leaks when rubber rings and plates make connections between steam and other plates. It is well to allow the ammonia to act on the shellac for several weeks before using the resulting mass as a lute.

Coloring of Cements.

THE pigments employed to color hydraulic and other cements, and obtain the shades common in trade, are, according to the Bauzeitung, the following, the proportions used being those used by R. Dyckerhoff, of Amoeneburg: For black, pyrolusite; for red, caput mortuum, 6 per cent; for green, ultramarine green, 6 per cent; for blue, ultramarine blue, 5 per cent; for yellow and brown, ocher, 6 per cent.

A PECULIAR INDUSTRY.—A peculiar industry is that of making clog soles and wooden shoes. The timber is first cut into planks, and on the side of each plank a metal gauge is laid, an operative then roughly outlining the size and number of soles which can be cut from it. The planks pass on to a band saw, where they are cut up into blocks with the required curvature for a sole, thence passing to the roughening machine which crudely shapes them. Another machine cuts the sides, another shapes the shanks, a third rounds the heels, and the toes are shaped by a fourth. From these they go to a revolving cutter, which roughly hollows the upper side of the sole, and subsequently this hollowed surface is smoothed in another machine. The soles pass next through various finishing machines, the bottoms, sides, shanks, heels and toes being thus successively rendered perfectly smooth by friction with swiftly revolving bands—the latter covered with a mixture containing ground glass and some other attrititive materials—which scour them in the same way as if with sand or emery paper. Finally a gripping machine bevels the edges, leaving a "grip" to which the leather uppers can be fastened. The sole of each wooden shoe, from the time when the log of wood is first cut into segments to the time when the edges are bevelled by the gripping machine, pass through fifteen distinct machines.

CORRESPONDENCE.

LIMA INDUSTRIES.

LIMA, ALLEN CO., O., July 7, 1882.

FROM OUR SPECIAL CORRESPONDENT.

There is much to attract the attention and interest of the visitor to this thriving city, which is steadily pushing ahead. It lies half way between Toledo and Dayton, has a population of 10,000, and has the good fortune, owing partly to its favorable geographical position, and in part to the enterprise, liberality and foresight of its citizens, to be served by four railroads, which run through it, affording all requisite facilities for securing the material of its manufactures and distributing these. A very fine Court House is in course of erection, the stone of which is quarried at Berea; its cost will be $175,000. One of the finest Opera Houses in the State is about being completed, at a cost of not less than $100,000. As may be supposed, the city is well supplied with capacious school houses and sightly churches. Its establishments comprise two grist mills, one tannery, several planing mills where they manufacture sash, doors and blinds; one large paper mill, which turns out about ten tons of paper daily. Lima can also boast a fine driving track, four Banks, and several good hotels, the most prominent of which is French's Hotel, located at the crossing of the P.,

F. W. & C. and the Dayton & Michigan roads. Among the manufacturing establishments I have inspected is that of the Lima Car Company, manufacturers of railroad cars, one of the largest firms here. They were established July, 1881, and the building of cars was commenced in March of last year. The Company owns 15 acres, of which the buildings cover about 5 acres. Their productions average ten freight cars per day. About 350 hands are employed at the works.——The Lima Machine Works, 47 Market street, builders of light weight locomotives suitable for wooden tramways or narrow gauge railways; also manufacturers of superior chilled car wheels, employ 125 hands. They have been in operation 13 years, and ship to Southern and Western States. They report trade good. Size of buildings, main part, 200x42 feet, two and a half stories high; blacksmith shop 130x30 feet; foundry 60x90 feet; boiler shop 100x40 feet; paint shop 60x30 feet. They owe the success of their locomotives to the absence of complication in the construction of these and durability and effectiveness. Their chilled car wheels weigh from 120 pounds upward, and have been thoroughly tested on wooden tramways and narrow gauge railways.——The Lima Wheel Co., manufacturers of wheel material, and whose specialties are spokes, felloes and bows, employ 60 hands. They have a branch esrablishment in Mercer county, where they employ 15 hands. The Company was established September, 1867. Shipments are made to Cincinnati, Dayton and Richmond, Indiana, also to the East. Trade is reported to have been good the past season, and a large number of orders are on hand. They are to commence right away to run their works 12 hours per day, so as to keep up with these. The members of the Company are Mr. M. B. Mahurin, Mr. W. H. Rodeheaver and Mr. L. Rastetter.——The Lima Iron Fence Company, lately organized has a stock capital of $50,000. The specialties are iron fencings, castings and verandahs. The company have just completed large works situated in the south part of town; size of buildings 50x200 feet. They will employ on an average 50 to 100 hands. The size of engine is 30-horse power. The following are the names of the officers: H. Kibby, President; E. Ashton, Vice President; H. Holmes, Secretary; T. T. Mitchell, Treasurer. From the mechanical and business talent these gentlemen embody, with their established connections and financial facilities, a brilliant future may be predicted.——The Globe Machine Company employs on an average 25 to 50 men. They have built a new brick block, size 50x45, for a general jobbing and repairing machine shop, which they have just occupied. The members of the company are practical mechanics and are assured of a large trade.——Messrs. Dobbins & Ashton, lumber dealers, Water street, west of Main street bridge, carry a full stock of pine lumber, lath, shingles, &c. They have been established a little over a year, and are doing an excellent trade, chiefly local. They employ 5 hands.

MISCELLANEOUS RECEIPTS.

AQUEOUS SHELLAC VARNISH.—About the solution of shellac in water by means of borax, Dr. Geissler makes the following remarks: "A varnish for covering maps, photographic prints, etc., can be readily prepared, as I have found by experiments, by merely shaking together two parts of a saturated solution of borax, and one part of pulverized shellac, applying no heat. Solution will be effected in two or three days. In three parts, however, the shellac is easily soluble. Bleached shellac must be preserved under water, and must be dissolved immediately after being powdered; for if the powder be exposed in the air for several days, it will dissolve only with great difficulty, and perhaps not at all. If in preparing the varnish a higher temperature than 50 or 60 degrees C. is employed, the liquid is apt to assume a faint reddish color; the finished varnish, however, bears heat very well. Now, this varnish may not only be used for rendering pictures, prints, maps, etc., glossy, but it forms an excellent starch gloss. In fact, this varnish will be found much more adapted for laundry purposes than any of the starch glosses found in commerce.

TO PREVENT WOODENWARE FROM CRACKING.—Wooden bowls and other ware of this sort, as well as all sections from tree trunks, and short logs cut for various purposes, are very apt to crack and split while seasoning. To prevent this completely, the pores of the wood should be well filled with linseed or some other vegetable oxydizing oil, while it is yet green, and before it begins to show any signs of cracking or checking. This will completely obviate this inconvenience.

TO STAIN WHITE WOODS IN PATTERNS.—The method is as follows: The surface to be decorated is made as smooth as possible. It is then coated with one or two coats of size, prepared by adding to the glue size of just sufficient strength to form a jelly, a little egg albumen and a small quantity of alum. When this is dry and thoroughly hard, the design must be traced or pounced upon it. The outline and those lines separating the different parts of the design, and all other parts that are to remain the natural color of the wood, are then carefully painted in with Brunswick black or Canada balsam, laying on the black with a good body. This should remain until it gets thoroughly hard, which will be in about six or seven hours. The surface is then washed with a sponge and lukewarm water until the size is removed from the exposed parts, the pattern drawn in the Brunswick black, which is impervious to water, remaining intact, and serving to prevent the stains running together when being applied. This washing must thoroughly remove all the size preparation, and after the wood has been allowed to dry it will be ready for the application of the colored stains. If the painting has been properly done, the design will appear as a clear black outline, the white spaces in which are to be filled in with various colors, after which the black outline is to be removed, as will be explained. The black lines should be fully one-sixteenth of an inch wide, and wider if required. Having decided on the woods to be imitated and the colors to be used, the stains, which may be either spirit stains or water stains, or both, may be laid in. The lightest stains must be put in first, and need not be confined to the exact outline of that particular part, but it is as well that they should be. The stain may be freely used and laid as level as it will allow, but a little shadiness is not at all objectionable. The next darkest stain may now be proceeded with, and so on for as many stains as are desired. When all are dry and hard, the black outline may be washed clean off the wood with a brush and turpentine, which may be used freely until the whole of the Bunswick black is removed. The various colored stains will then appear enclosed in a white outline, which, if properly done, will be sharp and clean and clear as an inlay of the real woods. What grain the white wood has will be more or less seen through the stains, as they may be light or dark. The work may then be French polished or varnished.

CEMENT FOR LABELING PAPER TO TINS.—(1) Add to ordinary paste a little honey or glycerine; (2) wash the surfaee of the tin with muriatic acid before affixing the label; (3) add muriatic acid to the gum; this is apt to cause the metal to rust under and around the label; (4) add a little ammonia or (5) tartaric acid to the starch paste or mucilage; (6) add alumnium sulphate (not alum) to the mucilage; (7) the best plan is said to be to add 20 drops of liq. antim. chlor. to 8 oz. of paste or mucilage.

CEMENT FOR RUBBER.—Powdered shellac is softened in ten times its weight of strong solution of ammonia, whereby a transparent mass is obtained, which becomes fluid after keeping some little time. In three or four weeks the mixtnre is perfectly liquid, and when applied it will be found to soften the rubber. As soon as the ammonia evaporates the rubber hardens again—it is said quite firmly—and thus becomes impervious both to gases and to liquids. For cementing sheet rubber, or rubber material in any shape, to metal, glass and other smooth surfaces, the cement is highly recommended.

MECHANICAL RECEIPTS.

REPAIRING CRACKS IN BOILERS.—A new method of repairing cracks in boilers (invented in Germany), consists in the use of a sort of wedge link—a pair of tapered pins connected with each other and in one solid body by a flat wedge.

TO KEEP IDLE MACHINERY FROM RUSTING.—Machinery that is idle for some time may be kept from rusting as follows: For the inside of cylinder and valve seat use the following: Tallow, 1 lb., rosin, ¼ lb., and beeswax, ¼ lb.; mix and apply warm. The foregoing protects the surfaces and may be removed at any time by the application of heat. For the bright work apply limewater (whitewash).

FOAMING OF BOILERS.—Sometimes foaming is the result of carrying the water too high, in which case it should be blown down to its proper level. When caused from poor circulation, or from defect in the design of the boiler, to remedy it the engine would probably have to be throttled or cut off closer, the fire dampened with coal, and the pump or injector started before the trouble would cease. Foaming caused by poor circulation is the result of the undue relation of temperature between the steam bubbles and the water, the excessive high temperature of the bubbles causing them to rise violently, carrying the water with them. When caused by a mucilaginous substance the only remedy is changing the water.

THE world will yet carry its quota of light along and go to the corner store and purchase electricity as it does now coal oil and kindling wood. It is said that the annual cost of lighting a Pullman car by the ordinary methods of English roads is $900, and the London News claims that with the outlay of $1,000 for a stationary engine, batteries, etc., a better light can be had by electricity for $250 a year. Several roads which have made recent experiments intend to adopt the electric light on their ordinary passenger cars. It is somewhat singular that the English railways gave the first practical trial of Edison's electric light in Pullman cars.

THE receipts of the Suez Canal for the year 1881 were over $12,000,000. The expenses, including interest and $2,000,000 for improvements, were about $5,720,000, leaving a clear revenue for the year of over $6,000,000. The returns for April, just at hand, report the passage of 322 ships, against 243 for April, 1881, and 198 for April, 1880. The gross receipts were $1,190,000 for the last month, against $875,000 for April, 1881, and $742,000 for April, 1880.

ITEMS OF INTEREST.

GOLD may be beaten to such a state of thinness as to transmit a green light, and this property is used as a test of the purity of the metal, since the slightest trace of silver causes a change of tint.

OF over 760,000 square miles of timber lands in this country, the south embraces 460,000 or nearly two-thirds.

TEN million feet of lumber is a large lot, but this is the amount a Boston firm sold to one New York house the other week.

EVERYTHING has its compensations. The floods in the South have brought out to market millions of feet of black lumber.

SIX millon pounds of graphite or plumbago are annually imported into the United States, and it is estimated that the home production in New York, Pennsylvania, Canada, and elsewhere equals this amount. This valuable material is used principally in the manufacture of lead pencils, stove polish and crucibles. Its market price varies according to quality, from $25 to $75 per ton.

MAGNIFICENT cypress timber is being run down the Sabine river to Orange, Texas, a distance of 500 miles.

SOME one has discovered that flowers may be kept for a long time by putting them into a glass air tight jar, with a morsel of quicklime wrapped in oil silk at the bottom. In this way they may be indefinitely preserved, even if the jar is opened from time to time.

NEWPORT NEWS was recently made a port of entry and the Chesepeake & Ohio railrord began some important enterprises at that point. Already business is looming up there, and has lately been marked by the sailing of a Brazillian steamship with 12,000 barrels of flour as part of her cargo. Freight is coming to the port from Kentucky and the Southwest, and the chances are very much in favor of a brilliant business future for this place.

A WEALTHY syndicate has recently been formed in Paris for the purpose of placing capital to the extent of 12,000,000 francs alternately in Chicago, to exploit a certain patent process in the applying of a new antiseptic compound for the preservation of food of all descriptions, and the exportation of this food to Europe.

MINES AND MINING.

Paper Read Before the Ohio Institute of Mining Engineers at the Nelsonville Annual Meeting.

BY R. M. HAZELTINE.

The discovery of coal and its employment in the United States the present century has proved pregnant of important results. It is not definitely known when the blocks of coal for which the Mahoning Valley is famous, was first discovered. It was known at a very early day to exist in various portion of the Mahoning and Shenango Valleys it cropped out in the ravines probably as early as 1800. The township of Youngstown having been surveyed in 1747, as wood was plentiful and was an impediment to tilling, the soil coal was noticed but little, and then only as a curiosity. The Pioneers little thought the black stone which would burn which lay exposed in the ravines along the Mahoning was destined to become a source of wealth to their children, and develope the valley into one of the most wealthy manufacturing regions in our country. Coal was little used except for blacksmith purposes until the opening of the canal in 1840, when Governor Tod sent five boat loads to Cleveland to be used as an experiment for generating steam. It was mined and shipped in a very small way up to 1845 when Messrs. Munroe & Vincent at the Clay Furnace in the Shenango Valley, and Wilkinson, Wilks & Co., at Lowell in the Mahoning Valley, discovered by actual experiment that it could be used in its raw state for the purpose of smelting iron. To these parties belongs the honor of being the first in the United States to use bituminous coal successfully in a blast furnace. Since that time the production gradually increased. In 1857 on the completion of the Cleveland and Mahoning railroad the mining and consumption of coal received great impetus, the output reaching 1,000,000 tons annually in 1872 and 1873, since which time it has gradually advanced to its present yearly aggregate. There are about thirty mines in operation in this region.

The geology of our region has been fully described by Professor Newberry in his Geological Report of Ohio, and our worthy president very ably and clearly set it forth in his annual report of 1876. as to the character of the mines, all now being worked are either slope or shaft except one, a drift. In surveying these mines the mining engineer is called upon and expected to perform a great variety of duties. First he levels the drill holes and locates the farm lines, and when the most advantageous point to open is ascertained, the kind of an opening to be made is decided on. Next he lays out the works, plans the railroad and prepares a drawing of the hoisting apparatus, shutes, etc. When the coal has been reached and mining operations pushed on the remainder, the mining engineer is called upon to estimate the coal taken out, crediting the proper parties. When unable to go himself he will have the pit boss make marks either on the roof or rib and estimates the work done at his leisure. The estimate is made as follows; After computing the area and the thickness we deduct the wastings which is far greater than when the mine is properly opened owing to the cutting of air courses partings, swamps, etc. After getting the cubical contents the number of tons is readily estimated, a cubic yard weighing 2150 lbs. on an average. From them on the engineer surveys the entrys and transfers, the land lines as they are reached are noted and the royalty between the land owners adjusted. air shafts are located, levels made through these mines for roads, drains, syphons, and frequently called upon to locate a slope for men or mules to travel on, or for the hoisting coal where they drive from both bottom and top to meet at some point between is the most particular and difficult piece of work that can be given any engineer and requires both skill and accuracy, for similar and less difficult work in other branches of the profession, engineers get a world wide reputation.

The mining engineer is called upon to examine mines as an expert, as to the manner in which they are being marked their safety, condition, the quantity of coal left and to be taken out, its quality, etc. He is summoned as a witness where large amounts of money are at stake, is asked to act as a referee between parties and has other duties imposed on him. to say nothing of the dangers to which he is exposed while on his perilous travels through the mines, in short it requires a life-time of experience and study to adequately fill the places expected of an engineer, and for which, few, it any engineers, are ever half paid for their services.

I now come to the instruments employed. In the early days of mining in the Mahoning valley the surveys were made with a common compass graduated to whole degrees and mounted on a Jacob's staff, the point of which was made very sharp, so that by a hard stroke it would stand in a tie and hold the compass; it was sometimes set in the debris that would accumulate in the corners between the ties and the rails. These surveys were made with the magnetic needle; as there was no iron used on the road at that time, and as the mines were small, it was sufficiently accurate. After the mining of coal became a business, and the introduction of strap iron on the roads, which has been recently supplanted with T iron, more accurate instruments had to be called into use; first was the Vernier Compass graduated on one quadrant; this was rather a crude instrument, but answered in its day. Next came the Transit, which is the most accurate of any instrument yet in use, but the objection lies against it that it is a laborious job to level it, and on a long survey will break any ordinary back; the guides also cast a shadow on the needle, which makes the reading unreliable. It is also a complicated instrument and a small injury that may fail to be observed will throw it out of adjustment and render the work inaccurate; its weight too, is a great objection, a Transit suitable for mine work being not less than twenty-five pounds, which makes it top heavy, with the uneven floor on which it sets, sometimes in mud, and sometimes in broken stone, which if allowed to stand any length of time between sights it is liable to move. This instrument carried along an entry five feet in height and of any length is no desirable load. The best instrument is the compass with a double Vernier. a six-inch needle mounted on a tripod with a shifting head, with as much through as you can get, at least three inches. The long needle gives a fine opportunity to get the lamp in to read. The space on each side gives a place to set the lamp while you put down your notes. Being on a ball and socket joint. it can be easily leveled and will stand firm on the tripod. It does not weigh more than ten or twelve pounds, is strong and no common injury will throw it out of adjustment; observations taken with it are clear and any irregularities can be readily corrected.

Next as to marking. This is a subject for especial study, and so far as my observation goes has no rule among engineers. Even in the same districts, in the early days of mining in our region, the surveys were made with a common compass. The former practice of making the marks by holes in the roof and the stations numbered with chalk on the side is still in general use, with the addition of nails sometimes driven into the sleepers, which have come into use since the introduction of instruments mounted upon tripods. In dry mines or on black or grey slate, or sand-stone roofs the chalk is as good as anything I have ever seen used, but in wet mines, such as are subject to being flooded, it washes and sweats off. Where chalk would not mark I have used, in some instances, fire clay with good results.

I now come to the subject of lights. During the primitive period of mining and mining engineering, when the magnetic needle was relied on wholly to determine the course, the tallow candle was generally used as a means of light for the miners, and fell naturally to the use of the mining engineer; and at what date its use was superceded by a lamp I am not informed. I used a candle with a lump of clay rolled up in the shape of a ball for a stick during my first surveys, for over a year, not being able to get a copper lamp made in our vicinity. Now every engineer has such a lamp. or a more tasty and better lamp of brass. But few tinsmiths have the requisite skill to make a brass lamp and they have no practical requirements of an engineers lamp, which are lightness, a large spout, and long, extending one-half inch above the lid, capable of holding fourteen to sixteen straws. The quantity of oil consumed is of no consideration to the engineer for he never buys it; but plenty of light facilitates the work, which is a greater consideration to the employer than the quantity of oil consumed, besides saving the eyes of the engineer. The lid is best to screw in, as a hinge lid is liable to fly open and spill the oil over ones note's. There should be a tube on top for an air hole to prevent the oil from flowing over and dropping, and if the lid should have a rim on the inside so that it will hold a cork, such a lamp can be held in any position without dropping the oil.

Although Alabama has long been known to possess great mineral wealth, the late examinations of the coal deposits in Fayette and Walker counties on the property of Major Thomas Peters by Col. J. Killebrew, proves she can be rated as the richest in this material of any Southern State. He says there are six seams of this coal from three to seven feet thick, any one of which will yield from 5,000 to 10,000 tons per acre, and of a quality unsurpassed by any in this country or Europe. It will bear shipment, make as good coke and gas as Connellsville coal, and be mined at less cost than any he has ever seen. It is also the opinion of this distinguished gentleman that there are larger fortunes to be realized from the Alabama coal fields within the next few years, than in any other portion of the United States.

The profits of digging in the Schuylkill, Pa., region, appear to be very great, as appears from the following statement in the N. Y. Coal Trade Journal.

The Mahanoy jig house has proven such a success that another near Heckscherville will go up this summer. They will have a capacity of 200 cars per day of pea, buckwheat and dust coal. In these houses the coal is agitated in water. Slate being the heaviest part drops to the bottom, and the coal is brought out cleaned of this objectionable part. To pick such small sizes of coal would be a tedious and unprofitable job. Under the new process pea coal will receive better treatment than by screening, and its market value will be enchanced. The company propose to treat the coal dirt at the collieries in this way, relieving it of about 18 per cent. of slate. The coal will be used in those engines of the comnany which are specially adapted to such fuel. The amount of dirt prepared in this way last year at a cost of 5 cents per ton, thus saving to the company over $120,000. When the new buildings and machinery made for treating the dirt are completed all stationery engines at the collieries and in the shops and foundries of the company will be supplied with it, and the marketable sizes of coal now used by the company will be sold to the trade.

The strike on the bituminous coal region at Pennsylvania stands thus in the soft-coal region in the vicinity of Clearfield, only a few mines, possibly 250 men, are working. There are no signs of disorder, and the miners are pleasant and good-natured. The present rate for mining is fifty cents per ton, and this the operators say is all they can pay in view of the existing low rates for coal. The men want 65 cents, the same figure for which the Cumberland miners are striking. At present it is useless to predict what will be the out-come of the strike. There is little coal on hand at present, and it is certain that unless the operators yield the demand cannot be supplied. The president of the Bituminous Coal Exchange has information that from one-third to one-half of the miners in Clearfield region are at work, notwithstanding the resolution adopted ordering a strike. Police protection will be sent from Philadelphia for the men who are at work.

It is stated that arrangements are being made by the companies to arrest the labor agents and leading agitators for conspiricy.

The Gem Mining Company, of Colorado, has declared a dividend (No. 7) of one per cent.

The Morning Star Consolidated Mining Company, of Colorado, has declared a dividend (No. 10) of two and a half per cent. on the capital stock, payable July 6th.

The Bonanza Developement Company, of Colorado, has declared a dividend (No. 6) of 15 cents per share, payable July 15th.

The Minas Nuevas Mining Company, of Mexico, has declared a dividend of 10 cents per share.

The Bulwer Consolidated Mining Company, of California, has declared a dividend (No. 8) of 10 cents per share, payable July 12th.

The Champion Works, of Springfield, have made a test of Sunday Creek Valley coal and find it superior to the Jackson, which they have been using in their maleable iron works.

From experimental tests made it seems neither the Hobking or Sunday Creek Valley coals will make good coke.

A party of Eastern capitualists, in company with prominent members of the Philadelphia syndicate which controls the noted Sierra mines, of Lake Valley, New Mexico, have been examining the Sierra Plata and Sierra Grande mines and the new mill which has just been completed. The mill runs as smoothly as a clock. It is a double mill, arranged to run 20 stamps, 16 pans, and 8 settlers, and cost $100,000. It is built on the most improved plan, and so economically arranged that with eleven employes from 60 to 100 tons can be milled daily. The Sierra group of mines cover an area of one square mile, which is dotted with numerous outcroppings of silver ore. Developements on the Plata and Grande are limited thus far to an extensive cut into the outcroppings and shafts from 40 to 125 feet deep at different points, including a joint shaft between the Plata and Grande, which penetrates a marvelous ore-body in what is called the "Bridal Chamber." This body of ore has been followed over 70 feet, and is from 10 to 30 feet thick. It is so rich and porous that at many points a candle-flame will melt it into silver globules. From the working-shaft of the Grande, the vein dips distinctly toward the Plata. Professor Silliman, the eminent mineralogist of Yale College, estimates the ore in one mine and piled on the dump at 5000 tons, of an average assay value of 100 ounces, and the sacked ore in the storehouse at 250 tons, averaging 1000 ounces.

Hon. J. M. Longyear, of Marquette, Mich. writes to the MINING REVIEW, in reference to the comparative profits of iron and gold and silver mining, as follows:

The article in the Mining Review of April 15th, headed "Iron Mining," says that "it is stated without the most careful consideration, that during the year 1881, the iron mines of Michigan were more profitable than the gold and silver mines of the United States." As I suppose that I am partially responsible for the publication of the statement, I wish to show you that the statement was not made without due consideration.

The published statements show that the gold and silver mines than the amount of dividknds paid by all the gold and silver mining companies of the United States. The capital stock of the gold and silver mining companies declaring this $7,500,000 of dividends amount to about $200,000,000; they, therefore, paid three and three-fourths per cent. on their capital stock. The capital stock of all the iron mining companies of Michigan operating in 1881 amounts to $20,000,000, and their net earnings for that year paid dividends amounting to 40 per cent. on their capital stock. These figures you will notice, embrace only the dividend-paying gold and silver mines, while they embrace all of the operating iron mines in Michigan. If the $200,000,000 represented by the dividend-paying gold and silver mines of the United States—to say nothing of the innumerable operating companies that pay no dividend— no further is necessary to demonstrate that iron mining in Michigan is more than ten times profitable as gold and silver mining.

There is now being taken out of the Cornwall ore hills, at Lebanon, Pa., 17,000 tons of ore per month. Most of this is manufactured into pig iron in the vicinity.

Ore shipments from the Park mine, Park City, Utah, are about $300,000 per month.

A coal mine has been opened in Walker county, Alabama, by the removal of but three feet of earth.

Over 60,000,000 bushels of coal have been shipped out of the Monongahela in the first five months of 1882.

The bullion shipments from Silver Reef Utah, to the month of May aggregate the handsome sum of $73,607.69.

The Douglas Company, Maine, have received $7,099.20 from the sale of ignot copper smelted on their own grounds.

SHEATHING IRON SHIPS WITH ZINC.

The question of the preservation of iron and steel vessels from the fouling and corrosion incident to sea voyages, appears to have been solved to some extent by the following process of sheathing iron ships with zinc, proposed some time since by Mr. J. J. Atkinson, of Brackley, England. The hull of the vessel, is fitted with thin sheets of zinc, attached by means of solder first to spots prepared by an electro-dynamo machine on the shell of the vessel, and then over the same spots when the sheathing has been fitted. Holes are perforated in the sheathing a little less than the diameter of, but made to correspond with, the prepared spots on the shell, which are spaced every way about 8 or 9 inches apart, and the application of solder, after the sheathing has been fitted, results in the fusion of the outer and the inner layers of solder, and consequently, the zinc sheathing between. The landing edges and laps of the several strakes of zinc plates are soldered throughout, the whole presenting a surface smoother than the most carefully sheathed wooden ship and not much behind iron vessels with their finishing coat of anti-fouling paint. The strong galvanic action incident to the conjunction of iron and zinc is a matter of common knowledge, and although the utilization of this knowledge for the purpose of ship-coating is not wholly new, the manner in which it is done by Mr. Atkinson's process removes almost entirely the objection to its adoption from an economic, as well as practical shipbuilder's. point of view. The waste of zinc, while not inconveniently rapid, is constant and effective in throwing off all species of fouling. Several English vessels have already been sheathed in this way, and the bottom of one of them which has been examined at intervals, has been found invariably to be clean and in every respect satisfactory, while it has been observed that a streak of the bare shell above the sheathing, which had been submerged, was always thickly incrusted with barnacles and other species of fouling.

CURIOSITIES OF OCEAN CABLES.

Of the total 97,200 miles of cable in the world, some 36,420 are owned and worked by the Eastern Telegraph Company and its affiliated companies, the Eastern Extension Telegraph Company and the South African Telegraph Company. The Eastern Telegraph Company is perhaps the most enterprising of cable corporations, and makes a very fine display at the Crystal Palace, London. Cable operations have been, says Nature, of great assistance to the geographer, and the soundings taken in order to ascertain the nature of the sea bottom, where a cable is projected, have enriched our charts quite as much as special voyages. There is, however, another way in which these operations could be made subservient to the cause of mutual silence; but it is a way which has not been sufficiently taken advantage of. Beside the specimens of stone, mud and sand, which the sounding lead brings up from the deep, the cable itself, when hauled up for repairs, after a period of submergence, is frequently swarming with the live inhabitants of the sea floor—crabs, corals, molusks, snakes and fifty other species—as well as overgrown with weeds and mosses of the bottom.

Many an unknown species has passed over the drums unnoted to rot and fester in the general mess within the cable tanks. We venture to predict a rare harvest to the naturalist who will accompany a repairing ship, and provide himself with means to bottle up the specimens which cling to the cable as it is pulled up from the sea.

Some idea of these trophies may be gathered from the stall of the Eastern Telegraph Company, where a few of them are preserved. Two of these are a very fine gray sea snake, caught on the Sagion cable in a depth of thirty fathoms, and a black and white brindled snake taken from the Batavian cable in twenty-five fathoms. Twisting around ropes seems to be a habit of this creature, for the writer remembers seeing one scale up a ship's side out in the river Amazon, by the "painter" hanging in the water.

A good example of a feather star is also shown; these animals being frequently found grasping the cables by their tentacles. A handsome specimen of the blanket spouge, picked up in the Bay of Biscay, is also exhibited. But the most interesting object of all is a short piece of cable so beautifully encrusted with shells, surpulæ and corals, as to be quite invisible. It was picked up and cut out in this condition from one of the Singapore cables. The rapid growth of these corals is surprising, and some valuable information on this head might be gained if the electricians of repairing ships in these eastern waters would only make some simple observations. Curiously enough, so long as the outermost layer of oakum and tar keeps entire, very few shells collect upon the cable, but when the iron wires are laid bare, the incrustation speedily begins, perhaps because a better footing is afforded.

A deadly enemy to the cable, in the shape of a large boring worm, exists in these Indian seas; and several of them are shown by the company. The worm is flesh colored and slender, of a length from 1½ to 2½ inches. The head is provided with two cutting tools, of a curving shape, and it speedily eats its way through the hemp of the sheathing to the gutta percha of the core, into which it bores an oblong hole.

A full account of this particular worm, with anatomical illustrations, is given in the Journal of the Royal Microscopical Society for October, 1881, by Dr. Charles Stewart, Secretary of the Society. The bore holes, after passing through the oakum of the inner sheathing, either pursue a tortuous course along the surface of the gutta percha core, or go right into the copper wire, thereby causing a "dead earth" fault, Dr. Stewart classes the worm as one of the Eunicidæ, but proposes for it the generic name of *Lithognatha worslei*, because of its possessing a pair of calcareous mandibles or cutting jaws, and after Captain Worsley, the commander of the repairing ship which picked up the worm eaten cable. The pair of calcareous jaws, in addition to the three pairs of chitinous ones, is the most remarkable feature of the animal, and the white plate which form them make the creature look as if it were in the act of swallowing a tiny bivalve shell.

The best protection hitherto formed against it is to cover the core with a ribbon of sheet brass, laid on without a lap. First the gutta percha is covered with cloth, then the brass is overlaid. Canvas is then put over the brass, and the hemp and iron wires over all. A close layer of iron wires is not a sufficient protection, for the worm can sometimes wriggle in between the wires where they are not close enough; and moreover the rapid decay of iron wires in tropical seas is certain to leave the core a prey to these pests in a few years.

The Eastern Extension Telegraph Company also exhibit some interesting samples of stones picked up from the sea bottom; for example, limestone blocks and shells bored by the bivalve, *Saxicava rag sa*, the worm Sebella, and the sponge *Hymeniacidon celata*; wood honeycombed by the toredo, a red stone pitted by the bivalve shell (pholas), and a ferruginous flaky stone brought up from the bottom between Penang and Singapore. Most interesting, however, of these inanimate waifs is a flat piece of black, flinty rock hollowed into cup-like pits by sucking feet of the sea hedgehog. The pits are excavated as lairs for the animal, and some of them are nearly three inches in diameter by one inch deep. To make the rocky bed softer to the feel, the hedgehog has lined it with a calcarous enamel, probably secreted by its body, much in the same way as the pearl oyster coats its shell.

In the earlier days of submarine telegraphy: Sir William Thompson declared the life of a cable to be practically inviolable; and Robert Stephenson, on the other hand, was of opinion that no cable would last out ten years. The latter view has proved the more correct, for the average life of a cable hitherto has been about eleven years. Thanks to the improved means of repairing them, however, the outbreak of faults does not mean the loss of a cable, for these flaws can be cut out in water, however deep, and the cable put to rights again. Indeed every cable company expects a recurrence of faults, and provides a fuly equipped repairing ship always on the spot.

SCIENCE AND INVENTION.

SEALING CORKS.—M. Potel has lately introduced a new compound for sealing over corks, and for molding various ornaments, etc. It is made, we learn, from a correspondent who highly recommends it, by soaking gelatine in water for a short time, and then dissolving it in glycerine, the former being in excess; to half the amount of glycerine thus used some tannic acid is added, and solution aided by the heat of a water bath; these solutions are then mixed, when the compound is ready for use. Any desired coloring matter may be added, and if required for the fabrication of any small article, sulphate of barium Pattinson's white (chiefly a hydrated oxychloride of lead) or white lead, may be worked in it until the correct color and texture is arrived at.

DEPOSITION OF METALS ON CASTINGS.—Three processes have been introduced by Herr F. Weil for the deposition of metals upon iron and steel castings. In the baths organic acids or glycerine take the place of the cyanides which are so hurtful to the health of the workmen, and expensive besides. The first method consists in plunging the articles in the bath in contact with strips of tin, and the coppering begins at once; the second, in placing in the vessel containing the bath, and the articles to be coated porous jars filled with a strong solution of caustic soda, in which are placed plates of zinc connected with the articles in the bath by a coarse copper wire; and the third, in the use of the same baths as in the first and second processes, in conjunction with a dynamo-electric machine.

A NEW STEEL.—Experiments lately made at Leipsic with a cuirass made of a steel the formula of which is kept secret, have given very remarkable results, which would seem to indicate that the new material combines both tenacity and ductility in the highest degree. The steel plate of the cuirass is only .06 inch thick, and lined inside with a layer of wool. Of 11 rounds from a Martini breech loading rifle fired at a distance of 175 yards, only two of the bullets pierced the metal, and even these were completely flattened and stuck in the lining, so that the suppositious wearer would have remained uninjured.

COVERING FOR STEAM PIPES.—A ninety per cent. mixture of disintegrated silicious shells found in certain German mines, and about ten per cent. of hair and gluten, has been found to be an excellent non-conducting covering for steam pipes, etc. The material from the mines is first dried and calcined.

LEATHER TOOTHED GEARS.—A Wurtemberg inventor has recently exhibited some toothed gear wheels made of leather instead of metal, the advantages claimed for them that they have a much quieter and more elastic run, are extremely durable, and require no lubrication whatever. These gear wheels are prepared from raw buffalo hides thoroughly cleansed from all hair, flesh, &c., and glued together in as many layers as are necessary to produce the breadth of wheel required. The cementing is of course effected under very heavy pressure as in an hydraulic press, this being kept up until the glue has completely hardened. From the sheets or plates prepared according to the method thus described, the teeth are cut, of uniform size and pattern, by saw and chisel.

DECIDING DEAD HEATS.—Mr. Muybridge, who was so successful in photographing the horse in motion, says there is no such thing as a "dead heat" in horse races. And he suggests that photography should be called in to decide where judges disagree. With the aid of photography, the astronomer, the pathologist, the chemist and the anatomist are enabled to pursue the most complex investigations with absolute confidence in the truth it reveals; why should those interested in trials of speed not avail themselves of the same resources of science? And he ventures to predict in the near future that no race of any importance will be undertaken without the assistance of photography to determine the winner of what might otherwise be a so-called "dead heat."

SPONTANEOUS COMBUSTION OF COAL.—Mr. Haedicke attributes the spontaneous combustion of coal to the presence of iron pyrites, which are oxidized in the presence of humidity, and change to ferrous sulphate. While this decomposition takes place the coal splits, and since the surface exposed to the air thus becomes greater, the ferrous salt changes into ferric salt, which gives its oxygen to the coal. In order to prevent spontaneous ignition, it is necessary to exclude air currents, unless a strong air current is caused to pass from the first, when it will act as a cooling agent. Humidity also prevents the formation and accumulation of oxygen, so that it may also be advisable to introduce steam jets at times into coal workings.

COMPRESSION OF GASES.—A new pump for the compression of gases has been invented by M. Cailletet. A quantity of mercury placed above the plunger moves up and down with it. An hour's work will give 400 or 500 gr. of liquid carbonic acid or protoxide of nitrogen. The compressed gases are stored in bundles of metallic tubes communicating with each other, and each holding about four liters. Pressures of several hundred atmospheres are attained. The movement of the mercury in the pump counteracts heating.

PROTECTION OF IRON HULLS.—Thin sheets of zinc over the bare iron or steel shell of vessels as a preservation from the ordinary corrosion of these metals, as well as from the fouling of the hull, are being introduced in the construction of English vessels, and with indications of success. The sheets are fitted over the shell and attached thereto with solder by a method in which an electro-dynamo machine takes part, all the edges and laps are soldered, and when the work is completed a surface is presented smoother than the most carefully sheathed wooden ship, and nearly equal to an iron vessel with its finishing coat of anti-fouling paint.

SOLIDIFYING ETHER AND TURPENTINE.—Messrs. Jordery, of France, have taken out a patent for solidifying ether and turpentine, so that they may be transported and scored with greater security. The evaporation of ether during the warm season is estimated at 25 per cent. of its weight, while turpentine loses 6 per cent. The cost of solidification is only 2 per cent.

NEW CONSTRUCTIVE MATERIAL.—A new material, made of the strongest fibers of manila and jute put together under great pressure, is being used in the manufacture of chair and settee-seats. It is finished in a variety of deep, rich colors by a process similar to that used in the manufacture of upholstery leather, which it very closely resembles.

A NEW ORNAMENTAL PAPER.—The following is the method employed by certain Belgian firms in the manufacture of an ornamental paper, which, on first sight, can hardly be distinguished from satin: Common paper is covered with an adhesive size, and asbestos, dyed to the shade required, is sprinkled upon the moist surface. Asbestos takes up all colors, especially the anilines, very readily. The superfluous matter, when dry, is easily shaken off.

SELF-WINDING CLOCK.—Mr. A. Dardenne, of Brussels, has produced a clock which is wound by a small windmill, placed in a ventilation pipe, chimney, or any other place where a tolerably constant current of air can be relied on. This windmill is by a reversed train of multiplying wheels, continually drawing over a wheel an endless chain, in one loop of which the clockweight is supported. As the loop hangs between the clock and the winding machine the weight is continually drawing through the clock the slack chain drawn up by the wind motor, and thus a constant motion is maintained. A ratchet wheel prevents the motor from turning the wrong way, and, by a simple arrangement, whenever the weight is wound right up to the top, the motion is checked by a friction-brake, automatically applied to the driving mechanicism. When the weight is thus raised to the top, sufficient energy is stored to insure the proper working of the clock for about twenty-four hours. Mr. Dardenne is now supplying these clocks for domestic purposes, and their freedom from disturbance and ease of management are arguments in favor of their adoption.

A NEW STOKING APPARATUS.—Messrs. William Miller & Co., of Glasgow, Scotland, are now manufacturing a new stoking apparatus, the principle of which is somewhat novel, and has the advantage of preventing smoke, effecting at the same time a great saving in fuel. The machine as constructed for boilers is driven by steam power, and by a simple arrangement is self-acting, and requires little attention. It consists of a box placed on rails or pivots, and provided with a movable bottom. After the box is charged it is moved underneath the bars of the furnace, at the same time pushing along a movable part of the furnace bars. When directly underneath the aperture thus created, the action of the machine raises the green fuel into the fire, so that both the smoke and gas from the fresh material pass through the mass of red coal, and are consumed. So far from this dampening the fire, it rather increases the heat-producing power of the coal, and allows it to become coked. The withdrawal of the box brings back the movable portion of the furnace bars, and the fire thus made up is always red on the top, and maintains a uniform heat. The opening of the furnace doors is, moreover, rendered unnecessary, preventing the admission of cold air into the fire, and the work of the fireman is made more comfortable. The apparatus has also been applied to kitchen ranges, in which case the appliance is worked by hand. The fire is perfectly under control, and a bright, clear flame is at all times maintained. The saving of fuel is calculated to be about 20 per cent., in addition to the other advantages gained by the use of the apparatus.

TELEGRAPHING IN MID-OCEAN.—M. Menusier proposes the following method of telegraphing in mid-ocean: Supplementary cables, reaching to the surface of the water, and sustained by luminous buoys, are to be attached to the submarine cables, at distances which are about equivalent to a day's sail. A ship passing these buoys could put the wires of its apparatus in communication, one with the wire of the buoy, and the other with the buoy itself, which would serve as a ground wire. The circuit would thus be completed, and the buoys being all numbered, communication could be immediately established with the central station. The inventor believes that he has provided against the danger of breaking the cables by tempests, and all other objections that are likely to be urged, and has satisfied able navigators who have examined his plans, that they would be likely to succeed.

COUNTERSINKING WOOD SCREWS.—A new and ingenious improvement in wood screws has recently been invented and patented by Mr. James W. Campbell, of Brooklyn, N. Y. The principal object of the invention is to provide a wood screw constructed so as to cut its own countersink, without materially increasing its cost. To this end the conical head of the screw is provided with a nick, shown in the accompanying engraving, the sides of which make an angle with each other, in order to give clearance to the chips made by a cutting edge at the extremity of one side.

ELECTRICITY AND THE MANUFACTURE OF ANILINE COLORS.—Mr. Goppelsroeder, a swiss chemist, has exhibited at the Paris Exhibition aniline colors obtained by an electro-chemical process. The process rests chiefly on the decomposition of water, which, under the action of an electric current, gives free atoms of oxygen at the negative pole. The oxygen acts on substances such as aniline, toludine, etc., which, by oxidation or dehydrogenation changed into coloring matters.

MISCELLANEOUS.

The use of Iron in Car Construction.

At the recent convention of the Master Car Builders' Association, John Kirby, of the Lake Shore and Michigan Southern Railroad, submitted a report on the substitution of iron for wood and steel for iron in car construction. "The past year," it was stated, witnessed a less rapid advance than formerly, but time is required to test each change thoroughly to prove that it is an improvement, and not a change for the worse. It is suggested that greater care should be taken against severe vertical strains. In their judgment, the weight of iron is ample in each bolster, but that it is too wide and too thin, lacking proper staying by thimbles or space castings and bolts. Substantial progress is being made in substituting iron for wood in car trucks.

COPYWRIGHT MARK ON POTTERY.—On April 5th the U. S. Senate passed a bill (S. No. 1,582) which allows the copywright mark to be placed on the back of designs for moulded decorative articles, tiles, plaques, or articles of pottery or metal, or in such other place as manufacturers of such wares are accustomed to put their private marks and trade marks. The revised statutes previously required the copywright mark to be placed on the face of the article. The change will be beneficial to the large and increasing and very interesting industry which has grown up in Cincinnati and Lakeville, Ohio; Chelsea, Mass., and in Pennsylvania and New Jersey, in the manufacture of pottery, vases, encaustic tiles, and ornamented works of art, like busts and medallions.

MARKETS.

FINANCIAL.

Office of TRADE REVIEW AND WESTERN MACHINIST.

FRIDAY EVENING, July 7.

There has been a fair borrowing demand for money. Rates of discount remain at 7 to 8 per cent. in bank, and in the open market for prime paper; and on prime collaterals money is readily obtained at 6 per cent. on specific time, and at 5 per cent. on call. The mercantile demand for Eastern exchange is slightly less active, and the market is easier in tone, but the rates are well sustained at par buying and at 1 20 per cent. premium selling. Dealers buy commercial bills at 1-20 dis@par. Local securities have been somewhat more active, and a firmer tone prevails, but the market is quiet at the close.

NEW YORK.—There is no change in the general monetary situation, but at the stock exchange money has been more active, and call loans took a very wide range, 4@5 per cent., however, being the prevailing rates in the past few days. The continuation of the freight-handler's strike has checked business in financial and mercantile circles. The stock exchange markets have been conspicuous for dullness. The half yearly report of the Lake Shore has disappointed a large number of operators.

IRON.

Values for pig iron have undergone no change, and prices are firm. Owing to the rapid absorption of the output there is little accumulation at furnaces. Offerings are moderate. Sales have been considerable, considering the season, which is ordinarily a transition one, many large undertakings being dependent on the out-turn of the crops, the issue of the labor troubles, and, generally, the financial condition of the country. Little disposition appears to exist to anticipate future requirements. We quote Foundry, No. 1 X, $25; Foundry, No. 2 X, $23; Gray Forge, $22. The market for Scotch Pig is quiet, but in consequence of an advance in the Glasgow market holders have advanced prices on some grades 50 cents a ton. The disposition shown to advance prices has checked sales. We quote Coltness $26.50 to $27; Glengarnock, $24 to $24.50; Gartsherrie, $26.50 to $26; Summerlee, $25.50 to $26; Carnbroe, $23 to $23.50; Eglinton $22.50 from dock, and $23 from yard; Langloan, $25.75, to arrive. Little has been done in Bessemer Pig; it has been offered at $24; $25 to arrive. Business in rails has been moderate, and mostly limited to American steel. The majority of mills have orders which will extend into the Autumn months. We quote Steel at mill $47.50@52, according to time of delivery. Iron rails are dull and nominal at $44@45 for heavy sections, and $46@48 for light. There is no inquiry for old rails, the quotations for which are nominal. Trade in bar iron has been slow; quotations will be found in our price list. Wrought scrap is unchanged. There is a good demand for sheeting from store. For steel the market is steady and unchanged. We quote Blooms $38. Tank iron is in steady demand, as also Plate, but for most descriptions of finished iron customers are by no means desirous of going beyond present supplies at card prices.

CINCINNATI.—(Reported by Rogers, Brown & Co.) The pig iron market has shown more animation during the week, and prices are noticeably firmer. A sale of 800 tons "Sewanee," * 1 mill, was made Tuesday, at a price equal to $21.87 cash, at Cincinnati, delivery through 90 days. The southern coke furnaces are, without exception, sold largely ahead, and, as a rule, are holding from 50 cents to $1 per ton higher figures than a week ago. Foundry business is better, and all branches of the iron trade begin to feel the good effects of improved crop prospects. The June sales of iron in Cincinnati were the heaviest of any single month in a year. We quote for four months: Hot Blast Foundry—Hanging Rock CC. No. 1, $27.00@$28.50; No. 2, $26.00@$27.50; Southern, No. 1, $26.00@@27.00; Strong Coke, No. 1, $24.00@25.00; No. 2, $23.00@$24.00; No. 3, $22.00@$23.00; Soft Stone coal No. 1, $23.00@24.00; No. 2, $21.00@$22.50. Forge—Strong, Neutral, No. 1, Mill, $20.50@$22.00; Cold Short, No. 1 Mill, $20.00@21.00. Car Wheel and Malleable—Hanging Rock Cold Blast, $33@34; Hanging Rock Warm Blast, $27@29; Southern Car Wheel Iron $34@36; Lake Superior do. $31@33; Lake Superior Malleable, $31@$33.

CINCINNATI—(Reported by E. L. Harper & Co.)—The business of the week has been large in Foundry irons, and the mills in operation are active consumers to their fullest capacity as they are running double turn. The tendency of prices is decidedly upward, many prominent furnaces have blown out, or banked up, and the supply is curtailed materially. The adjustment of the labor differences, which will in all probability, be effected in course of a fortnight will call for immediate delivery of all surpluses to be found, and the condition of the stock at the furnaces will be found inadequate. The crop is assured, and abundant, the prudent conduct of merchants and manufacturers throughout the spring and early summer give assurance of good financial preparation for a healthy fall business, and with a consciousness that the bottom has been reached and passed, security is felt in all legitimate plans for the near future.

HARDWARE.

Trade, though not so active as could be wished, may be characterized as fair, and the aggregate of sales would probably exceed that of the corresponding period of last year. The fall business is certain to be influenced to a great extent by the yield of the crops, for which indications are favorable. The nail trade has been quiet, but the tone of the market is strong. We quote 10d. to 60d. $3.40, net, per keg; for small lots an advance of 10 to 15 cents on this price is asked. On July 1st the reduction of 5 per cent. on silver plated forks and spoons, as determined on by the Silver Plated Flat Ware Association, took effect. The Hollow-ware manufacturer's Association has confirmed existing prices for tinned and enamelled cast-iron hollow-ware. The demand for mechanics' tools continues unabated, and there is a good run on household utensils.

TIN AND TIN PLATES.

Pig has ruled firmer at 22½@22¾ cents, but the demand has rarely exceeded lots of 25 tons, and mostly for smaller quantities. We quote for round lots Banca 28 cts; Straits and Malacca, 22 3-8 to 22 1-2; Billiton 22 1-2; Australian 23 1-2; English L. & F., 23 1-2. The London market has advanced to £98. For tin plate trade is good and he market firm, in sympathy with the Liverpool market, which is reported advancing. Last quotations from Liverpool are Coke Tin 16s, Charcoal 18s.@20s. We quote Charcoal Bright, $5.87½@6.25; ditto Ternes, $5.37½@5.50; Coke Tin, $5.50@$5.37½, and ditto Ternes, $5.25. The import of Tin Plates into the United States during the first 10 months of the fiscal year, ending June 30, has been 5,195,357 cwt., or 159,768 tons, worth $13,289,970, against 2,705,652 cwt., or 135,283 tons, worth $11,665,217 the previous year.

SPELTER AND ZINC.

The market for Spelter, both foreign and domestic, is somewhat dull; sales of the former have taken place at $5.40@5 42½, and of the latter at $5.40@5.50. We quote Bertha Refined, 8c, and Bergenport, 9½c. Business in London is light, with prices fluctuating. The import of spelter into the United States during the first 10 months of the fiscal year ending June 30, has been 14,819,032 lb, or 6616 tons, worth $592,898, against 1,305,883 lb., or 583 tons, worth $51,141 the previous year. Sales of Domestic Sheet Zinc have taken place at 7 3-8 cents, and foreign at 7¼c.

LUMBER.

The receipts at this port have been light. Trade is dull, but prices firm on the most desirable styles, and with a slight decline on kinds with which the market is best supplied.

COPPER.

A moderate business has been done in Lake Ingot, and the market closes quiet at 18c@18¼c, July or August delivery. "Anchor" brand and Baltimore are worth nominally 17⅝@17¾c; Arizona rules at 18c. Ingot smelted by the Taunton Copper Company from Western ores is being jobbed in the Eastern markets at 17⅝c@17¾c. London was last cabled £1 ($5) lower for Chili bars, which are quoted at £67 5s.; Best Selected £73.

LEAD.

The market for Common Pig is quiet but strong. Sellers ask and obtain 4.80@4.85 cents, according to brand and quality. Refined is quoted at $4.90 @4.95. St. Louis Hard now brings $4.50, and Soft $4.65. The import of Pig Lead into the United States during the first 10 months of the fiscal year ending June 30, has been 6,935,668 pounds, or 3097 tons, worth $234,762, against 2,494,400 cwt., 1113 tons, worth $87,385 the previous one The combination prices of manufactured lead are as follows: Bar 6½c; Pipe 7½c; Sheet 8c; Tinned lined Pipe 15c; Tin Pipe 45c. All less 10 per cent.

WOOL.

The wool market has been more active, but purchases are mainly confined to legitimate requirements. In this State some large purchases are reported at 40c. Combing and delaine wools are in especial request. At sales in the Eastern markets Ohio X & XX washed fleeces brought 42@42½c; Ohio No. 1 combing brought 45@47c, and fine and medium combing and delaine 44@47c.

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LUMBER.

PLANK, MIXED WIDTHS.
2 inch, 12, 14 and 16 feet, together.

A 1 and 2 uppers	$50
A 3	40
B	32
C	21
D	15
E	13

1¼ and 1⅜ inch.

A 1 and 2 uppers	$48
A 3	40
B select	32
C	21
D	15
E	13

BOARDS.
One Inch, mixed widths.

A 1 and 2 uppers	$44
A 3	36
B select	30
C	20
D	15
E	13

STOCK BOARDS.
12 Inches wide.

A 1 and 2 uppers	$45
A 3	38
B	32
C	21
D	16

STRIPS.
6 Inches wide.

A 1, 2, and 3	$40
B	33
C	22
D	17
E	13
Norway Fencing Strips	17
Norway Flooring Strips	25

WORKED LUMBER
FLOORING.

Flooring—A 3	$42
B	38
C	24
D	20
Norway Flooring—A 3	28
C	22
D	18
Matched Drop Siding, 6 inches—A 3	42
B	38
C	24
D	20

Beaded Ceiling $2 higher than Flooring.

One half inch Bevel Siding—A 1 and 2	24
A 3	20
B	18
Ash Flooring—A 1 and 2	40

BILL STUFF.

Small, joists, 12, 14 and 16 feet	$14
18 feet and under	$15
Timber, larger than 8x8 special.	
Timber, longer than 18 feet, adds about $1 per foot per M. extra.	
Cedar Posts, large	30 00
" " medium	25 00
" " small	$15 to 20 00

SHINGLES, LATH AND MILL WORK

Shingles XXX	$4 50
Clear Butts	3 25
Lath	3 00

Surfacing, one side, adds $1.25; two sides $1.50
Matching, flooring and drop sidings, $2.50.

LAKE FREIGHTS.

COAL.

Buffalo to Chicago	$.62½@.65
Toledo to Chicago	1.00
Cleveland to Chicago	70@75
Erie to Chicago	70@75
Oswego to Chicago	1.50
Fairhaven to Chicago	1.30
Buffalo to Millwaukee	70@75
Cleveland to "	70@75
Erie to Milwaukee	75
Buffalo to Racine	80
Buffalo to Kenosha	85

IRON ORE.

Marquette to Lake Erie ports	1.25
Escanaba to Lake Erie ports	90@95
Escanaba to Chicago	90@95
Marquette to Chicago	1.15@1.30

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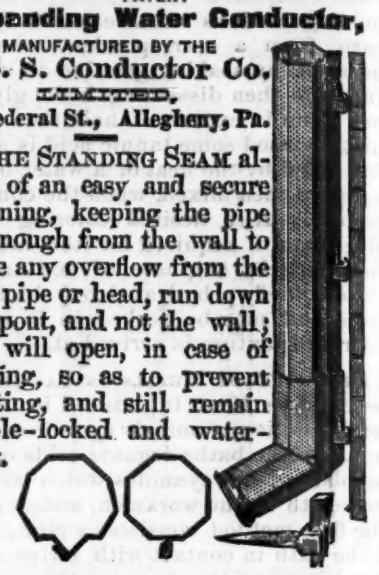
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Eagle, Amer...per lb. 10c dis 20
Wright's.....10¾c@11c
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Trenton.....10¾c
Wilkinson's.....10⅛c

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Solid Box, list of July 1, '79, dis 35
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Saw Filers, Hopkins' ℔ doz $17.50, dis 10
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Richardson's Vise and Anvil.....dis 25

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C S cut augurs.....40&10
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D C gimlet do Ives....dis 50
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Animal Pokers.

Berea, per doz.....4 00
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Cast Iron Barrel Shutter, etc.....dis 50&10
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Blacksmith's com new list, 45℔ct
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Wrought brass.....65&10
Cast, loose joint.....10&10
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Wrought fast joint broad.....40&10
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4 inch per doz.....4 50
4½ do do.....5 50
5 do do.....7 50
5½ do do.....8 50
6 do do.....9 50
7 do do.....11 00

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4 inch, per doz.....4 00
4½ do do.....5 00
5 do do.....6 50
5½ do do.....7 50
6 do do.....8 50
7 do do.....9 50

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4 inch, per doz.....2 00
4½ do do.....2 50
5 do do.....3 50
5½ do do.....4 00
6 do do.....4 50
7 do do.....5 50
25 per cent

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Hot and cold cutting.....℔ lb 30
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Packing.....50
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Meriden Cutlery Co, table..net
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Naugatuck Cutlery Co...list net
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Per number.....4@ 4½

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Coil by cask,.....

3-16	¼	5-16	⅜	7-16	½
10½	9	8	7	6½	6½

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Blacksmiths', each...$2.50 dis 10
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Cheney's.....dis 25
Hartford Hammer Co.....dis 20
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Verree.....dis 5
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20 to 60d.....3 40
8 and 9d.....25
6 and 7d.....50
4 and 5d.....75
3d.....1 50
2d.....2 75
3d fine.....3 00
2d fine.....3 75
⅝ inch.....3 00
4d barrel.....1 00
1¼ inch barrel nails.....1 50
1¼ do do do.....1 75
1 do do do.....2 50
⅞ do do do.....3 00
Cut spikes, all sizes.....25
Clinch nails, all sizes.....1 75
Casing and box nails 75 cts advance
Finishing nails, $1 25 do
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Nuts, square.....7c off list.
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Railroad, 4 to 5 lbs...doz $7 75
5 to 6 lbs.....7 75
to 7 lbs.....8 50
7 to 8 lbs.....9 50
Railroad Tamping Pick.....
7 to 8 lbs..doz 13 50
Mill Picks per lb.....75c

Rivets.

Iron.....dis 40
Tinned.....dis 40
Copper.....dis 33⅓

Squares. Dis

Steel or iron, case lots.....50
Try squares and T bevels.....40

Spikes—WROUGHT

All lengths by ¼ inch.....4¼c
do do do 5-16.....3½c
do do do ⅜, 7-16 & ½in 3¼c

Shovels and Spades.

Ames' new list, July 1, 1881,.....dis 15
Old Colony.....dis 15
Remington's (Lowman's Patent).....dis 30
Rowland's.....dis 40 and 10
Griffiths.....dis 40&10

Saw Sets.

Boynton s patent X Cut, per doz $12; Hand Saw, per doz $10.....dis 20
Stillman's Genuine, per doz $3 50 and $5 50.....dis 20
Stillman's Imitation, per doz $3 25.....dis 20&10
Common Lever, per doz $2 dis 30&10
Leach's No. 0 $8; No. 1 $15; dis 15
Hammer, Hotchkiss $5 50, dis 10
" Bemis & Call Co.'s new patent.....dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer..dis 30&5
Bemis & Call Co.'s Plate..dis 10
" " Cross-cut dis 12½
Aiken's Genuine...$13, dis 50&10
" Imitation.....$7, dis 50
Hart's Patent Lever.....dis 20
Disston's Circular.....dis 40

Sad Irons.

From 4 to 10 lbs....per lb 3¾ net
Self-Heating.....℔ doz $9 net
" Tailors..℔ doz $18 net
Gleason's Shield and Toilet.....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott's Irons, square back.....dis 35
Enterprise Star Irons.....dis 40
Combined Fluter and Sad Iron.....℔ doz $15, dis 15

Scales.

Hatch, Counter, No. 171 ℔ doz. $42, dis 37½&10
Union Platform.....$6, dis 45
Fairbanks'.....dis 20
Buffalo Scale Co.....dis 20&5
Forsyth Scale Co.....dis 25
Howe's.....dis 20&10
Chatillon's Eureka.....dis 25
Family Universal.....dis 50
Scale Beams.....dis 33⅓&10

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Planes.

Ohio Tool Co.....dis 25
Sciota.....dis 30
Bailey's Pat. Adjstble..dis 20@25

Rules.

Stanley.....dis 66⅔ and 10

Sash Locks. Discount.

Payson Mnfg. Co. "Perfect"..42
Simmons' Sash Supporters..20

Hinges.

Champion double acting spring hinges.....dis. 30
Screw & Strap 8@12 in.....$6. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10

Screws. Dis

Flat head iron or steel per cent dis.....30
Flat head brass.....30
Round head iron or steel..25
Round head brass.....20
Brass and Silver capped..40
Japanned, list of Plain Screws.....20
Coach, patent Gimlet point, list per 100.....60
Lag, taper points.....60
Bed.....10
Machine, flat head, iron..55
round head, iron 50
Bench, iron.....55&10
wood, beech, per doz $3.....10
wood, hickory.....20&10

Valves. Dis.

Jenkins' Patent Gate Valves..35
" " Globe " ..40
" Standard Packing " ..20

Wrenches.

Coe's genuine.....40 & 10
Coe's imitation wrought bar..60
Mechanics'.....60 and 10

Wire.

Brass and Copper.....dis 20
Bright & annealed, Nos. 0 @ 18 dis 50@52½
" " Nos. 19 @ 26 dis 60
" " Nos. 27 @ 36 dis 65
Coppered.....Nos. 0 @ 18, dis 45
Galvanized, Nos. 0 @ 18, market list,.....dis 40@45
Tinned, Nos. 0 @ 18,.....dis 40@45
Cast steel.....dis 40
Tinned Broom Wire, Nos. 18 @ 25.....dis 55
Annealed Fence, Nos. 8 and 9.....dis 55@52½
Annealed Grape, Nos. 10 to 14.....dis 52½
Galvanized Telegraph, Nos. 7 to 9.....℔ lb 7½c
Galvanized Telegraph, Nos. 10 to 11.....℔ lb 8½c
Galvanized Telegraph, No. 12.....℔ lb 10½c
Fence staples.....℔ lb 5½@5¾c
Fence Staples, galvanized, ℔ lb 7@7½c
Stubs Steel Wire.....$7 00 to £
Barb Wire, painted.....8½c
Barb Wire, galvanized.....9½c
Crucible Steel Ropes from ⅜ in. at 9c to 1¼ in. at.....52c
Best Selected Iron Ropes from 3-16 in. at 8c. to 1¼ in. at.....8Sc

Boiler Plates.

("Gaylord"--Standard Quality.)
C. No. 1.....4 50
C. H. No. 1 Shell.....4 75
C. H. No. 1, 50,000.....5 25
C. H, No. 1, 55,000.....5 75
C. H. No. 1 Flange.....6 50
Firebox.....
T. S., 60,000.....(as per)..6 50
T. S., 65,000.....(act of)..
Homo. Steel, 70,000 (of Cong).7 50
Heads, ½c ℔ lb. extra.
N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Sheet and Tank Rivets. "Norway."

All sizes.....dis. 15

Boiler Rivets—"Albany."

⅛, ¼, 11-16, and ¾ in. diam.5 50

Boiler Makers' Tools.

Doty's Power Shears....net list
" Hand Lever Shears.net list
" Power Punch.....net list
" Hand Punch.....net list
Steel Screw Punch.....net list
Iron Screw Punch.....net list
Boiler Plate Rolls.....net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander....dis 15
Roller Tube Expander..net list
National Tube Cleaner...dis 20
Wire Flue Brushes.....net list
Anvils—"Peter Wright" 12½℔lb
Solid Box Vises.....net list

Nuts, Bolts, etc.

Square & Hex. Nuts..6¾ off list
Washers.....6¼ off list
Machine Bolts.....dis 60
Bolt Ends.....dis 60
Boiler Patch Bolts.....net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch.....dis 25
"National" Special Locomotive Tubes.....net list

IRON AND STEEL.

Flat Bar.

1½ to 4 by ¾ to 1 inch.....2 85
4¼ to 6 by ¾ to 1 inch.....3 00
1¾ to 6 by 1¼ to 1½ inch....3 25
1¼ & 1¾ by ¾ to ¾.....3 00
1 & 1¼ by ⅜ to ¾.....3 10
⅝ ¾ and ⅞ by ⅜ to ¾.....3 25

Round,

1 to 1⅞ inch.....2 85
2 to 2¾.....3 15
2¾ to 3¼.....3 45
3¾ to 4.....3 50
4¼ to 4½.....3 45
4¾ to 5.....4 90

Square.

1 to 1⅞ inch.....2 85
2 to 2¾.....3 10
2¾ to 3¼.....3 45
3¾ to 4.....4 00
¾ to ⅞.....3 00

Heavy Band.

1½ to 6 by ¼ and 5-16 inch.3 10
1 to 1¾ by ¼ and 5-16 do 3 15
⅝ to ⅞ by ¼ and 5-16 do 3 50
⅜ to ½ by ¼ and 5-16 do 3 10

Half Oval and Half Round.

Wagon box iron ¼ and ⅜..4 80
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1½ to 6 by ⅛ to 3-16.....3 50

Hoops.

1¼ to 2 , Nos 16 to 18.....3 90
1¼ to 4 do 13 to 15.....3 60
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24.....5 60
No 25 to 26.....5 85
No 27.....6 10
No 28.....6 60

English Steel.

Best cast.....℔ lb 15½c
Extra cast.....16¾c
Round machinery, cast.....15c
Swaged, cast.....18c
Best double shear.....15½c
Blister, 1st quality.....13c
Refined tool steel.....16½c
Spring calking.....7¼@7½c
German steel, best.....11c
2d quality.....10c
3d quality.....9c.
Sheet cast steel, 1st quality.....15½c
2d quality.....14½c
3d quality.....12¼c

American Steel.

Best brands of refined cast steel.....12c
Crucible machinery.....8c
Open-hearth ditto.....5c
Hammer cast steel.....9½c
Spring cast steel.....7½c
Bessemer and open-hearth spring.....5½c
Ditto plow.....5½c
Steel boiler plate.....6½@7c
Bessemer machinery..5 @6c
Spring and calking.....7¼@7½c
Tire.....5
Sleigh shoes.....5

Bessemer Steel Tire.

⅝ to 1 by 3-32.....4½ ℔ lb
⅝ to 1 by ⅛ to 5-32.....4½ ℔ lb
⅝ to 1 by 3-16 to ¼.....4½ ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit.....1
Axle steel for wagons.....7
Frog points and plates.....8
Frog size bars.....8½
Pick, plain.....90
Mattock, beveled.....9
Table cutlery.....8½
Trap spring steel.....9
Pike and cant hook.....8½
Coal and granite.....8½

TINNER'S STOCK.

Tin.

Banca, large pig...per lb. 33c
Straits....." 25c
English....." 25c
Bar....." 27c

Tin Plate,

IC 12x24 charcoal.....$ 7 00
IC 14x14 do.....11 00
IX 14x14 do.....14 00
IXX 14x14 do.....17 00
DC 12½x.7 do.....6 75
DX 12½x17 do.....8 75
DXX, 12½x17 do.....10 75
DXXX, 12½x17 do.....12 75
IC, 20x28 do.....14 50
IX. 20x28 do.....18 50
IXX, 20x28 do.....22 50
IC, 14x20, Best Roof.....6 25
IX, 14x20, do.....8 25
IC, 20x28 do.....13 00
IX, 20x28 do.....17 00
IC, 10x14 Best Coke.....6 00
IC, 10x20 do.....9 75

Solder.

Half and Half, in bars.....17
No. 1 do.....15
Spelter Solder.....25

Pat Planished Sheet Iron.

{A}.....per lb 10½c
{B}.....9¾c

Nos	10	15	21	25
to	14	20	24 & 26	
Com	3-60	3-80	4-00	4-20
Char	5-60	5-00	6-00	6-20

Sheets over 28 in. wide ¼c extra

Zinc.

Sheet, cask.....7½@ 7⅝
Sheet, open.....8@ 8½

Tinners' Tools & Machines.

Machines (P. S. & W.) list add 20
Tools (P. S. & W.).....add 6

Gas and Steam Fitters' and Machinists' Supplies.

Gas and Steam Pipe.....dis 60.
Enameled Pipe.....dis 65
Artesian Well Casing....net list
Hydraulic Tubes.....net list
Malleable Iron Fittings..net list
Cast Iron Fittings.....dis. 35
Globe Valves.....dis. 35
Angle Valves.....dis. 35
Check Valves.....dis. 45
Safety Valves.....dis. 35
Eddy Gate Valves.....dis. 20
Steam Cocks.....dis. 35
Service Cocks.....dis. 35
Ball Gauge Cocks (net per dozen).....$15
Compression Gauge Cocks dis. 35
Miss. Gauge Cocks.....dis. 35
Register Gauge Cocks (net per dozen).....$15
Cylinder Cocks.....dis. 30
Air Cocks (net per dozen)...$2 75
Oil Cups.....dis. 30
Steam Gauges.....dis. 30
Water Gauges.....dis. 45
Scotch Glass Tubes.....dis. 60
Steam Whistles.....dis. 35
Iron Body Globe Valves..dis. 35
Iron Body Safety Valves..dis. 35
Iron Body Steam Cocks..dis. 35
Pipe Tools.....special
Globe, Angle and Check Valves (Star's regrinding).....dis. 25
Mack's Injectors.....dis. 25

Babbitt Metal.

No. 1.....℔ lb 16
" 2.....14
" 3.....10
" 4.....8

LEAD.

American, ℔ lb.....5½@5½c
Bar, ℔ lb.....6½c net
Pipe, ℔ lb 7½c dis 10 per ct
Sheet, ℔ lb.. 8c dis 10 per ct
Tin-lined pipe ℔ lb 15c dis 10 pr ct
Shot Drop 7c; Buck.....8c
Chilled Shot.....8c

COPPER.

Lake Ingot.....18 @18½c
Baltimore.....17⅝@17¾c
Arizona.....18c

Sheathing Braziers Copper, Bolts, &c.

Brazier's Copper, ordinary sizes, 16 oz. per sq. foot, and over per lb.....30c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq foot, per lb. 32c
Brazier's Copper, 10 oz. and 12 oz. per sq ft...per lb. 34c
Brazier's Copper lighter than 10 oz. per sq ft...per lb. 36c
Circles less than 84 inches in diameter per lb. 33c
Circles 84 inches in diameter and over.....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz per sq. ft.....per lb. 28c
Bolt Copper.....per lb. 30c
Copper Bottoms..per lb. 31@32c

No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x18.....per sheet 6c

All other size sheets, 2½c per square foot For tinning both sides, double the above amount.

SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES.

	Net Tons.
No. 1 wrought scrap	$24
Sheet and hoop "	10@11
Cast scrap,(No. 1 heavy)	19
Cast Scrap (Stove Plate)	12

OLD METALS.

Old copper per lb	15c
No. 1 H. Brass per ℔	14
Heavy yellow Brass do	12
Light Brass per ℔	12
Scrap Zinc per lb	6
Tea Lead per ℔	4
Heavy Lead per ℔	3

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe.

Inside Diameter. Inches.	Plain, Price Per Foot.	Galvan or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛..	08		.40	.24
¼..	08	$0 11	.54	.42
⅜..	09	12	.67	.56
½..	11	15	.84	.85
¾..	13½	19	1.05	1.13
1 ..	19	28	1.31	1.67
1¼..	27	40	1.66	2.26
1½..	33	47	1.90	2.69
2 ..	46	64	2.37	3.66
2½..	75	1 00	2.87	5.77
3 ..	95	1 30	3.50	7.55
3½..	1 25	1 70	4 00	9.05
4 ..	1 50	2 05	4.50	10.73
4½..	1 75	2 40	5.00	12.49
5 ..	2 25	3 00	5.56	14.56
6 ..	2 75	4 00	6.62	18.76
7 ..	3 75	....	7.62	23.00
8 ..	4 75	....	8 62	28.00
9 ..	6 50	....	9 68	34.40
10 ..	8 00	....	10.75	40.64
12 ..	12 00	....	....	54.65

Discount, 62½ per cent; galvanized, 62½ per cent.

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos not thinner than No. 28, wider than 2 in. not wider than 14 inch.....30c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in. inclusive.....35c
All Nos. to No. 28, inclusive, and widths over 20 to 30 in. inclusive.....38c
½c per lb. advance on each No. above Nos. 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at.....53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches .37c

Low Brass.

4c per lb. more than High Brass.
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal
In Bars.....48c
Sawed.....51c
Planed or Polished...54c

For Slitting.

Metal in width in. to ¼ in. to No. 28, inclusive, 1c per lb advance.
Metal, in width 2 in. to 1 in., thinner than No. 28, 2c per lb. advance.
Metal, in width ½ in. to ¼ in. thinner than No. 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths, add 7c per pound.

COAL.

WHOLESALE.

Wholesale f.o.b vessel at Cleveland:

Carbon Hill and Monday Creek.....$2 65
Massillon.....2 75@ 2 85
Brier Hill.....3 25@3 75
Pittsburgh.....3 00
Salineville.....2 25
Tuscarawas.....2 25

RETAIL.—Delivered.

Massillon Lump.....$4 00
" Nut.....3 75
Carbon Hill and Monday Creek, lump.....3 75
Carbon Hill and Monday Creek, nut.....3 50
75c less on cars by car load.
Anthracite Stove and Chestnut.....7 15
Egg and grate.....6 00

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15	7 50
11x14 to 15x24	8 50
16x24 to 20x28	9 75
15x34 to 24x30	10 75
26x28 to 24x36	11 50
26x36 to 26x44	13
26x46 to 30x50	14 00

DOUBLE THICKNESS

6x8 to 10x15	11 7
11x14 to 15x24	13 25
16x24 to 20x28	15 75
15x34 to 24x30	17 25
26x28 to 24x36	18 50
26x36 to 26x44	21 25
30x50	22 50
30x52 to 30x54	23 25
30x56 to 34x56	25 00
34x58 to 34x60	27 75
36x60 to 40x60	30 00

Dis 60 & 15 single, 60 & 20 double

OILS.

Pure Oils. packages included

Sperm, winter bleached per gal	1 25
Whale, winter bleached per gal	63
Straits	50 @ 53
"A" oil for tanner's use	35 @ 40
Lard oil extra W S	98
do No 1 do	83
do No 2 do	68
Tallow oil	75
Neatsfoot oil pure	1.05
do No 1	90
Linseed oil, raw	55
do do boiled	58
Cotton seed oil white	64 @ 66
do do yellow	60 @ 63
West Virginia lubricating 28 deg	13c@15c
Pure Mecca	55@ 50
Paraffine oil winter pressed	25@ 30
Machinery	40
Engine	50
Miners' oil	40@45
Drilling oil	40

Hides and Leather.

Prime cured hides,	7¾
Green hides	6@6¼
Bull, scrubby, badly scored or damaged, cured, two-thirds price.	
Prime dry hides	13@14
Horse hides, green	$1 75@2 00
Horse hides, dry	$2 00@2 25
Prime cured veal calf.	12½
Prime Deacon Skins, salted	65@70
Pelts, wool on	32@34
Fresh slaughter sheep	30@$1 50
Fresh slaughter lambs	50@60
Green calf skins	13
Hemlock rough	23@20
Oak harness	34@33
Oak sole	37@40
Union harness	31@40

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W. E, Ana ytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers

SMITH & TEACHOUT — (Established 1857.) Boiler, Tanks, Stills etc. 439 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND BOILER WORKS mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills Bet. Wasson St. and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig Iron. Rooms 1 and 2.

Carriage Blacksmith.

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platfo m trucks. Horse shoeing and general blacksmithing .93 Woodland ave.

Carriage Bolts.

TIECOLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furnture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 177 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

SLATER, G. A., Carriage dealer, sells the best work for the lowest price. A fine assortment always on hand. Repository 365 Euclid Avenue.

Coal and Pig Iron.

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 122 Water Street.

Electrical,

ELECTRIC SUPPLY CO. manfrs and dealers in Electric Burglar Alarms, Annunciators, Cell Bells and Batteries. Telephone lines built and repaired. 145 Seneca Street.

Fresco Artists.

KEMMER & KUSHMAN DECORATIVE CO., Fresco Artists, Fine Modern Wall Papers. 338 Euclid ave.

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

VIADUCT FOUNDRY COM'Y, Aenis, Carlin & Strangward manfrs of Machinery Castings Fine Light Castings a Specialty. Office & Works 11 13 15 and 17 Detroit Strert, near Center.

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway.

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws, 11 So. Water

Flue Cleaner.

CLEVELAND FLUE CLEANER M'F'G. CO. manufacturer of Aitchison & Doolittle's Patent Steam Flue Cleaner, 22 & 24 Power Block.

Hotels.

FOREST CITY HOUSE, cor. Public Square and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL, Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street.

Hardwood Lumber.

MARTIN, J. T. dealer in Hardwood Lumber, Stone's Levee, near Central Way.

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed umber, timber, lath shingles, etc. 47 Central Way

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

Cleveland Business Directory.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manuf'rs. of Steel and Iron Wire and Steel Tire.

WORTHINGTON, GEO. & CO., Hardware and Dealers in Metals, Water street.

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

Machinery and Boilers.

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

Machinery Depot.

CLEVELAND MACHINERY DEPOT, (now National Machinery Depot.) The largest stock of New and Second-hand Engines, Boilers and Machinists' Tools. Shop and Warehouse corner Bond and Superior streets.

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO., manufacturers of lubricating oils. 23 Euclid ave.

Paints and Oils.

MASTERS, J. N. jobber in Paints, Oils, Varnishes. Brushes, 34 Prospect st.

Pattern and Model Makers.

WHITTINGHAM, J. & C., Metal Pattern and Model makers 52 Canal Street.

STAIR BUILDER.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio

JOHNSON & PURSER, Stair Builders, and manuf'rs of Mantels, Odd Pieces of Furniture, &c. 30 West street, up stairs.

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

Tanners.

GAENSSLEN BROS., Tanners, and dealers in leather, oil and shoe findings. 80 Water-st.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample Trunks and Cases a Specialty. 56 Public Square.

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents. 17 & 18 Board of Trade Building. 122 Water Street.

Wood Carving.

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

Business Directory.

Akron, O.

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill and Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Ag'nt

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

Alliance, O.

ARLINGTON HOUSE, cor. Main and Liberty Streets. Centrally located. Sample Room for Commercial Travellers. H. S. Adams, proprietor

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing

Cuyahoga Falls, O.

THOMAS BROTHERS, manfrs of Ohio Stone Ware. Cuyahoga Falls Stone Ware Factory, cor. Main and Broad streets,

TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

SNYDER, H. wholesale manufacturer of Sash, Doors, Blinds, &c. Send for Price Lists.

THE CUYAHOGA FORGE AND IRON CO., manfrs. of every description Car, Truck and Driving Axles, Forging, Shafting. &c.

Canal Dover, O.

HECKMAN, E., manufr. and dealer in harness leather, upper, kipp and calf. Also, manufacturer & dealer in prime English Dairy cheese. Highest market cash price paid for hides.

Business Directory.

Columbus, O.

PAT. ADJUSTABLE WINDOW CURTAIN Cornice, manufactured by Strader's Curtain Cornice Works.

ROYCE & PULLING manufrs of Patent Steam Pumps for all purposes. Store room 30 High street. Works Nos. 5 and 7 Scioto street.

U. S. CARRIAGE CO. builders of fine Carriages, Buggies and Phætons. Salesrooms and Office 257, 259 and 261 Fourth street.

REYNOLDS BROS., manufacturers of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

Canton, O.

DIEBOLD SAFE & LOCK CO., manuf'rs. Safes, Locks, Bank and Safe Deposit Works.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc

NEW AMERICAN HOUSE, Canton. Fred. Hipp, Prop.

EBERSOLE & KAILEY, Machine and Jobbing Shops Gearing for Patterns or Machinery a specialty. Models of all kinds made & repaired.

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Massillon, O.

CITY CARRIAGE WORKS, P. H. Young, prop. manfact'r of Carriages, Phætons and Spring Wagons. Work warranted. Cor. Tremont & Erie.

Painesville, O.

NORTH AMERICAN CUTLERY CO., m'f'r's of Steel Shears and Scissors—best quality.

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect sts.

BALDWIN, D. L. & SON, Contractors & Builders and manfrs of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

Steubenville, O.

DORRANCE, D. W., Tool Works, manufacturer of hand-made miners' and stone-cutters' Tools Promp attention given to mail orders.

Sandusky, O.

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacobs' Patent Neck Yokes.

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO. builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry

RUSSELL IRON WORKS, manfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Cor. Water and Lagrange streets.

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss Springs, &c. made to order. 92 St. Clair Street.

UNION Wooden Ware Manufacturing Co. manufacture Sewing machines, washboards, children's wagons, carts, wheelbarrows, sleds, kitchen wooden ware, &c.

HEPBURN BROTHERS, proprie. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street foot of Cherry.

Youngstown, O.

BELL, EDWIN & SON, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock.

DINGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath.

MORTON HOUSE, formerly Maitland House. James Morton, Prop.

TOD HOUSE, cor. Diamond and Market streets. Henkel & Bowman, Props.

Zanesville, O.

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

Rochester, Pa,

OLIVE STOVE WORKS, (limited) manufacturers of Stoves and Hollow Ware.

Erie, Pa.

ERIE STEAM BENDING WORKS. H. G. Fink, prop'r, manufacturer of Bent Felloes, poles, snafts, bob runners, etc. Cor. 12th & Cherry.

GUNNISON, A. B., wholesale manufacturer of Wood Pumps. 233 East Twenty-Second St.

BALL ENGINE CO., limited, manufacturers of Automatic Engines of 15 to 30 horse power

NOBLE SEWING MACHINE CO. manfrs of the New Noble Sewing Machine. Send for circulars and prices.

A. B. FELGEMAKER & CO. Church Organ builders. Descriptive catalogue furnished on application.

Business Directory.

Titusville, Pa.

FOSTER & MCKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, nr. Railroad.

Meadville, Pa.

CURRY & CO. general jobbers in Castings of al kinds.

Oil City, Pa.

REID, JOS. Machinist, steam engine and pump repairing. Brass and iron castings, light and heavy, made on short notice.

Sandy Lake, Pa.

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List.

Pittsburgh, Pa.

PRINTING PRESSES. W. A. Bunting, manufacturers' agent. Printers supplies, type, cards. 42½ Sixth Street. [Up stairs.]

BAIR & GAZZAM, practical machinists; gear cutting a specialty. Rice's Feed Water and Heater. 17 Wood street, corner First Avenue.

Wheeling, W. Va.

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pulties, Shafting, &c. Cor. 18th & Chapline streets.

Louisville, Ky,

HAIGHT, ROBERT, Gold, Silver and Nickel Plating and Brass Finishing Shop. Car Trimmings and Steamboat work a specialty. 1 West Market street

Union City, Ind.

LAMBERT, J. W. & CO., mfrs of fork, rake, hoe and broom handles; spokes, hubs, whiffletrees, yokes, plow-rounds, &c. Correspondence solicited.

Olean, N. Y.

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Rochester, N. Y.

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KELLY, PETER, Boiler Maker, Mill street, cor. Furnace. Sheet iron work made to order

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. GRAHAM & CO.

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WISEMAN, Albine, manufacturer of all kinds of Shoemakers' Tools. 117 North Water St.

ULSCHT & LINN mfrs of Wood Lathes, Engraving Machinery, &c 131 N. Water street

RAZOR STROPS. Sole mfrs. of all kinds of Razor Strops. Ulscht, Linn & Co. 131 N. Water

Buffalo, N. Y.

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling machines, foot and power lathes. 70 Columbia street.

EMPIRE STATE MF'G CO., O. F. Swift, prop'r, manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio

WHITE, L. & I. J. manfrs of Coopers' Tools, Carpenters Tools, Draw Shaves, Cleavers Choppers, Ship Tools, &c. 312 Exchange street.

THE BUFFALO NUT AND BOLT CO [Limited.] Manufrs. of Hot Pressed Nuts, Bolts, Washers, Rivets, &c. No. 226 Ohio Street.

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GREAT WESTERN CHAMPAGNE. Finest made in America. Equal to best imported. Has taken highest awards everywhere, and is used all over the Continent. Try a case, and you will have no other. Pleasant Valley Wine Co., Rheims, N. Y.

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J. ESTEY & CO.,

Brattleboro', Vt.

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Engraver on Wood
Cor. Circle & Market Sts.
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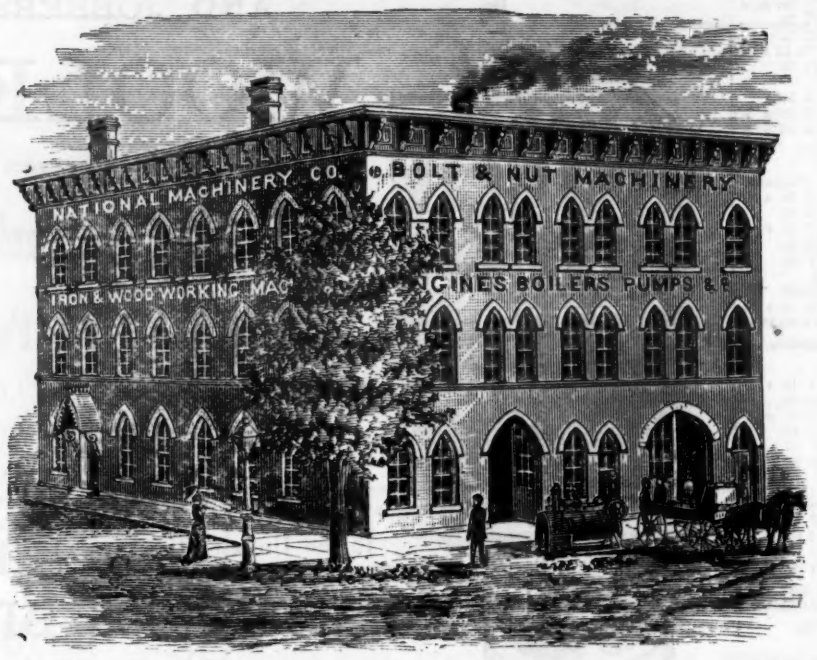
CLEVELAND
ELECTROTYPE
FOUNDRY
55 FRANKFORT STREET 55
CLEVELAND, O.

To Whom it may Concern:

The National Machinery Comp'y



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On account of want of room and facilities to overtake their orders, are

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RAILROAD FACILITIES, COAL, ETC., for the REMOVAL OF THEIR WORKS. Employing over ONE HUNDRED mechanics, with a $5,000 monthly Pay Roll, they could guarantee, with larger accommodations and as soon as men could be had, to run about Two Hundred Hands, and in the future to increase this number. They propose having

THE BEST TOOL SHOP IN THE WEST,

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Being the only Specialists in the United States in their Line they are comparatively independent of location for business.

ADDRESS, The National Machinery Company,
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CHAIN BELTING FOR TRANSMITTING POWER. The only medium made that will transmit so nearly ALL the power applied. No slipping nor lost motion. Especially adapted for driving HEAVY SHAFTING, ROLLER TRAINS in ROLLER and RAIL MILLS, TRACTION ENGINES, AGRICULTURAL MACHINERY, ELEVATORS, DRAGS, HOISTS, DREDGING MACHINES, LIFTING CRANES, ELEVATING NUT, SLACK and PEA COAL, SAWDUST and TAN BARK CARRIERS, &c., &c., &c., manufactured and sold by the **LECHNER MANUFACTURING CO., Columbus, O.** Also manufacturers of the LECHNER COAL MINING MACHINES, and power ROTARY COAL DRILLS. For further information send for Circulars.

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SECTIONAL
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AND APPLIANCES.
Model Furnace for 1881,
All steel, light and durable, with Revolving Grate, etc. Also
Judson's Practical Stoking Attachment
Guaranteed to feed coal, coke or charcoal without choking the draft.
Manufactured only by the patentee,
W. E. JUDSON,
Cleveland, O

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For Doors, Sash, Blinds and Windows,
American, French & Plate Glass
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Power and Foot Presses,

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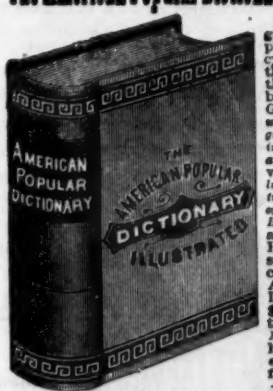
FOR WORKING
Sheet Metal and Wire.

FRUIT CAN
And Tinners' Tools, &c.
Nos. 147 and 149 Elm Street,
BUFFALO, N. Y.

The American Popular Dictionary, $1 Only



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TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

Trains marked with a * are the only trains that arrive and depart in this city on Sundays.

EAST BOUND TRAINS.

	Arrive.	Depart.
No. 20 Limited Express	*1:35 A.M	*1.50 A.M
No. 6 Atlantic Express	*7:05	*7 30
No. 10 Buffalo Accom	11:00	11.15
No. 8 C. & St. L. Exp.	*2:25 P M	*2.55 P.M
No. 4 Special N. Y. Exp	10:10	10 35
No. 2 San. Div. Accom.	10:12	
No. 12 Conneaut Accom.		4.50
Nottigham Accommodation (Sundays only)	10.05 A.M 4.45 P M	9.00 A.M 2.15 P.M
No. 18 Elyria Accom.	8.50 A M	

WEST BOUND TRAINS.

	Arrive.	Depart.
No. 13 Mich. Accom.		6.40 A M
No. 1 Special Chicago Ex.	*6 35 A.M	7.00
No. 3 Toledo Express	1.25 P.M	3 30 P.M
No. 21 St. Louis Express	*1 40	*2.05
No. 5 Pacific Express	*7.05	*7.35
No. 11 Conneaut Accom.	8.40 A M	
No. 19 Pt. Clinton Accom.		5.00
No. 7 Michigan Exp.	*2.50 A M	*3.05 A.M
No. 17 N. Y. & Chi Ex.	12.23 P M	12.33 P.M

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'polis Ex.	*7 10 A.M
No. 8 C. T.V. & W. & Clev Accom.	10 30
No. 12 St. Louis & New York Exp.	*3 00 P.M
No. 4 Special Cin & New York Exp.	*3 40
No. 10 Wheeling & Cleveland Exp	7 15
No. 6 Indianapolis & Columbus Exp.	10 20

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	8 00 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex.	7 10
No. 3 St. Louis & Cincinnati Ex	†2 00 P.M
No. 5 Night Express,	*7 25
No. 7 C T.V. & W. & Col. Accom	4 00

†This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

No. 4 Wheeling & Cleve'd Exp	7 15 P.M
No. 2 Uhrichsville Accom	10 30 A.M

DEPARTURES.

No. 1 Wheeling & Cleve'd Exp	7 10 A.M
No. 3 Uhrichsville Accom	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 7 Mahoning Valley Accommo.	10 55 A.M
No. 3 New York Express,	*7 00 P.M
No. 1 New York Express,	6 50 A.M
No. 3 Pittsburgh Express,	*7 00 P.M
No. 5 Pittsburgh Express,	2 00
New York Express	2 00
No. 9 Youngstown and Pitts. Local	10 15

DEPARTURES.

No. 12 New York Express,	*7 10 A.M
No. 4 Youngstown Local,	11 00
No. 8 Mahoning Accommodation,	4 25 P.M
No. 2 New York Express,	10 45
No. 12 Pittsburgh Express,	*7 10 A.M
No. 6 Pittsburgh & Main Line Express	2 30 P.M

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Mail	1 45 P.M	8 50 A.M
Express	6 55	2 30 P.M
Alliance Accommodation	10 15 A.M	3 45
Ravenna Accommodation	8 35	5 35
Night Express	6 30 A.M	†11 40 P.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

ARRIVE.		DEPARTURES.	
No. 2 Accom.	10 15 A.M	No. 1 Mail	8 15 A.M
No. 6 Express	1 35 P.M	No. 3 Accom.	2 20 P.M
No. 4 Mail	6 30 P.M	No. 5 Exp.	6 05

Special trains leave on Sunday at 8.30 A. M. and 4.20 P. M., arriving at Cleveland at 10 A. M. and 6.25 P. M.

Trains leave from Depot foot of South Water Street.

Connotton Valley Railway.

Arrive.		Depart.	
No. 1	10 05 A.M	No. 4	4 05 P.M
No. 3,	7 15 P.M	No 2	0 15 A.M

All trains arrive and leave depot corner Commercial and Fifth Streets

Cleveland, Akron & Columbus Railroad,

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc

	ARRIVE.	DEPART.
Mail	1 15 P.M	8 00 A M
Express	7 25	1 50 P M
Accommodation	10 10 A.M	3 45 P.M

Geo. Oliver,

Manufacturer of the

IMPROVED UNITED STATES

BRAN DUSTER,

Mill street corner Brown

Rochester, N.

Bran Duster Brushes and Wire Cloth furnished to order at Lowest Prices.

EDWARDS, TOWNSEND & CO.

WHOLESALE GROCERS,

And dealers in

Wines, Liquors and Cigars,

Teas a Specialty.

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CLEVELAND, O.

Lehman, Richman & Co.

IMPORTERS

AND JOBBERS OF

WOOLENS

And Manufacturers of

Men's, Youths', Boys' and Children's

CLOTHING!

86 & 88 WATER STREET, CLEVELAND, O.

invite the attention of close and short time buyers to the LARGEST STOCK between New York and Chicago, at prices guaranteed AS LOW as made by ANY responsible house in the United States.

Greatest Rock Breaker

ON EARTH.

CAPACITY { **A TON A MINUTE.** Don't Forget It!

Guaranteed to do Double the Work of any other or Money Refunded.

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MOSER & THOMPSON,

MANUFACTURERS

Corrugated Iron Siding for Grain Elevators a Specialty.

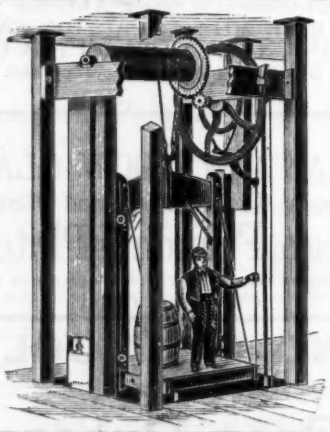
Iron Ore Paints.

29, 31 & 33 River Street,

CLEVELAND, OHIO.

Send for Circular and Price List, mentioning this paper.

SIDING



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BUILDERS EXCLUSIVELY OF

Elevators & Hoisting Machinery,

Hydraulic,

Steam and Hand Power, for Passenger and Freight.

Manufacturers' Agents for the

OTTO SILENT GAS ENGINE,

From 1 to 25 horse power.

ALSO THE RIDER HOT AIR PUMPING ENGINE,

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All kinds of Trucks made to order.

Factory, 175 West Larned-st.,—Office, 64 Griswold-st., DETROIT, MICH.

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Black Birch Carriage, Wagon and

TRUCK HUBS.

Sizes from 3½x6½ to 18x22.

R. M. WHITNEY,

OLEAN, Cattaragus Co., N. Y.

Cleveland Foundry.

CASTINGS

For Machinery and Rolling Mills.

Car Wheels

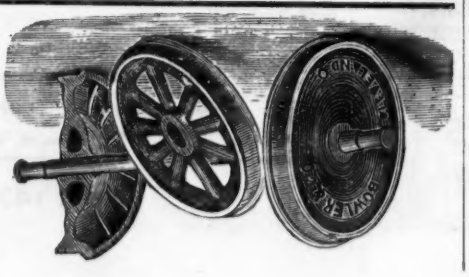
all sizes and kinds, with and without Axles.

Chilled Faced R. R. Frogs.

STREET RAILROAD TURN O UT

Nos. 9, 11, and 13 Winter Street.

BOWLER & CO.



Blue Grass Route of Ohio

TIME TABLE.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

Schedule No. 5--Dating from Sunday, June 4.

SOUTH-BOUND TRAINS.

STATIONS.	Accom	Accom	Expr	Mail	Sunday only
Leave.	P. M.	P. M.	P. M.	A.M.	P. M.
Cleveland	5.30	3.45	2.30	8.50	....
Hudson	6 53	5.02	3.35	10.10	4 20
Cuyahoga Falls	7.11	5.30	3.53	10.29	4 40
Akron	7.23	5.46	4.10	10.42	5 00
*North Portage	P. M.	6.00	4 24	10.54*	6 14
Clinton	.....	6 19	4.44	11.09	5 31
Warwick	.....	6.29	4.49	11.14	5 37
*Marshallville	.....	6.43	5.02	11.27*	5 50
Orrville	.....	6 58	5.14	11.42	6 03
*Apple Creek	.....	7.17	5.32	11.58*	6 22
Fredricksburg	.....	7.32	5.45	12.11	6 37
*Holmesville	.....	7.43	5.55	12.21*	6 48
Millersburg	Accom	7.55	6.08	12.34	7 00
	A. M.	P.M.			A.M.
Millersburg	5.50	.....	6.08	12.34	7 00
*Killbuck	6.02	.....	6.20	12.47*	7 13
*Black Creek	6.13	.....	6.31	12.59*	7 25
Gann	6.33 B 6.53 S	.....	6.51 7.11 S	1.19	7 47
Danville	7 04	.....	7.20	1.29	7 59
Howard	7.13	.....	7.29	1.38	8 10
Gambier	7.22	.....	7.38	1.47	8 20
Mt. Vernon	7.35	.....	7.51	2.00	8 33
*Bangs	7.45	.....	8.01	2.1.*	8 45
*Mt. Liberty	7.53	.....	8.09	2.20*	8 54
Centerburg	8.05	.....	8.18	2.30	9 06
*Condit	8.19	.....	8.32	2.44*	9 19
*Sunbury	8.27	.....	8.40	2.53*	9 28
*Galena	8.32	.....	8.45	2.58*	9 34
Westerville	8.48	.....	9.00	3 15	9 50
Arrive at Columbus	9.15	....	9 25	3 40	10 20
	A M		P M	P M	A.M

NORTH-BOUND TRAINS.

STATIONS.	Expr	Mail	Accom	Accom	Sundays only
Arrive at	P. M	P. M.	A. M.	A. M.	A.M.
Cleveland	1.45	6.55	10.15	8.30	....
Hudson	12.35	5.48	8.53	7.15	10.30
Cuyahoga Falls	12.16	5.30	8.33	6.58	10.11
Akron	12.03	5.17	8.20	6.45	9.58
*North Portage	11.46	5.00*	8.03	A. M.	9.34
Clinton	11.30	4.44	7.46	.....	9.18
Warwick	11.25	4.37	7.37	.....	9.12
*Marshallville	11.10	4.27*	7.23	.....	9.00
Orrville	10.57	4.14	7.10 B 6.40 S	.....	8.47
*Apple Creek	10.40	3.56*	6.22	.....	8.27
Fredricksburg	10.26	3.43	6.08	.....	8.13
*Holmesville	10 16	3.33*	5.58	Accom	8.02
Millersburg	10 05	3.22	5.45		7.50
			A. M.	P. M.	P.M.
Millersburg	10 05	3.22	.....	8 35	7.25
*Killbuck	9 51	3.08*	.....	8.23	7.13
*Black Creek	9 39	2.57*	.....	8.11	7.01
Gann	9.17	2.36	.....	7.49	6 38
Danville	9.07	2.27	.....	7.39	6 25
Howard	8.58	2.18	.....	7.29	6 14
Gambier	8.49	2.09	.....	7.14	6 03
Mt. Vernon	8.37	1.57	.....	7.02	5.51
*Bangs	8.22	1.40*	.....	6.46*	5.37
*Mt. Liberty	8.14	1.31*	.....	6.37	5.28
Centerburg	8.05	1.22	.....	6.28	5.17
*Condit	7.51	1.09*	.....	6.14	5.03
*Sunbury	7.42	1.01*	.....	6.06	4.53
*Galena	7.37	12 56*	.....	6.00	4 47
Westerville	7.20	12.40	.....	5.43	4 30
Leave Columbus	6.55	12.15	.....	5.15	4.00
	A M.	P M		P. M	P M.

* Stop on signal. B Breakfast. S Supper.

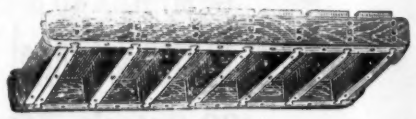
Special Round trip rates will be made for Sunday trains.

N. MONSARRAT, Gen'l Supt. Akron, O

E. T. AFFLECK, General Passenger Ag't, Columbus, O.

D. J. C. ARNOLD,

Manufacturer of



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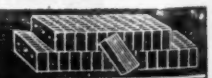

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10:45 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m.; Meadville, 3:50 a.m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:30 a.m.; Corning, 12:53 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS,—daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:15 a.m.; via Sharon and Sharpsville to Meadville 7:40 p.m; Corry, 9:10 p.m.; Lakewood, 9:50 p.m.; Jamestown, 10:00 p.m.; Salamanca, 11:10 p.m.

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p.m.

7:10 A.M. PITTSBURGH EXPRESS,—(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p.m. and 4:20 p.m.

11:00 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 10:55 a.m. 2:00, p.m. 7:00 p.m., and 10:15 p.m.

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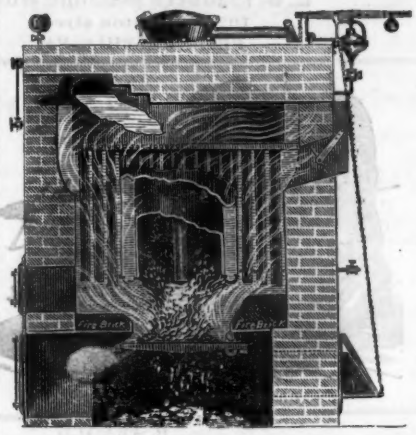

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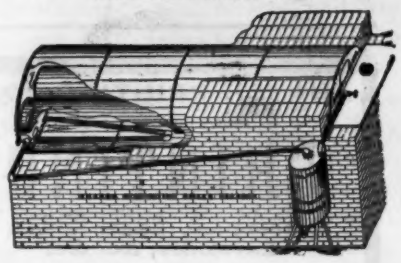

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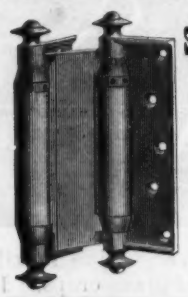

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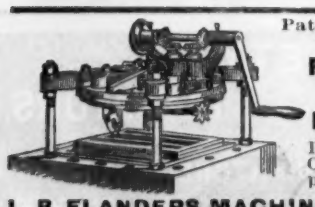

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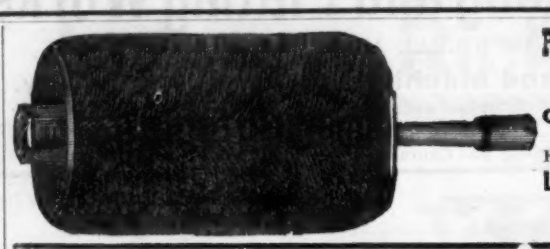

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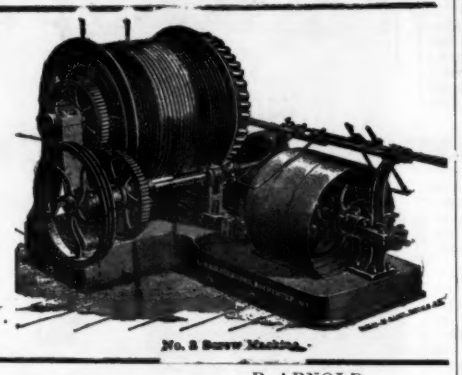

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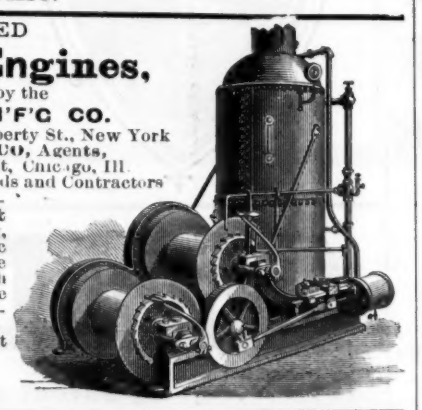

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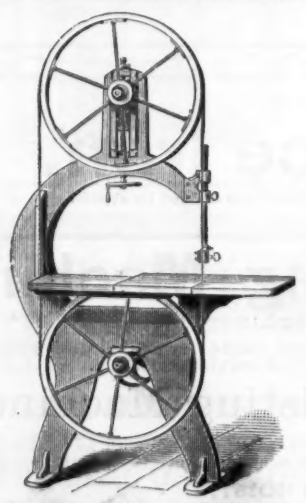

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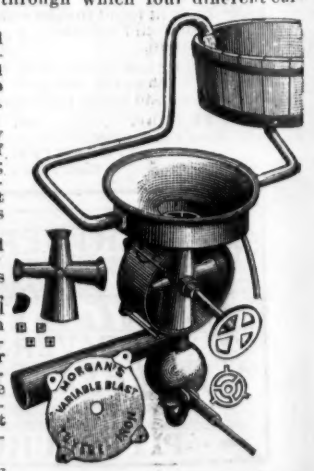

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